NORTHERN HYDROCARBON DEVELOPMENT IN THE NINETIES: A GLOBAL PERSPECTIVE

Edited by Freddie T. Frankling

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EDITORIAL NOTE:

This volume is more than the record of a conference. It is designed as a book, most of whose readers will not have had the opportunity to attend either the Yellowknife or Calgary meetings. The topics and chapters are arranged, therefore, in convenient and logical order, which does not necessarily coincide with the order of presentation in the meetings. Most of the papers were already written at that time and are reproduced essentially as received. In a few cases, papers were transcribed from the tape recordings made during the sessions. Questions and discussions following presentations are included in some cases. The sessions of Working Groups are represented in this volume by short reports. These were prepared by Secretariat staff in association with Chairpersons of the Groups.

The conference included formal banquets and lunches in Yellowknife and Calgary. The guest speaker in Calgary was Mr. Jack Shields, M.P., Parliamentary Secretary to the Minister of Energy, Mines and Resources. Banquet and lunch addresses by The Honourable Nellie Cournoyea, Mr. Jacques Gérin and Mr. Ian M. Doig are contained in this volume.

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PREFACE

On September 6, 1988, in Yellowknife, Northwest Territories, Prime Minister Brian Mulroney signed the agreement-in-principle for a Northern Energy Accord. This event marked a further stage in the evolution of government in the North - an evolution which has profound significance for those who live there, for the hydrocarbon industry with its plans for development in the North, and for all Canadians concerned for the future of a very large part of their country. Less than a month later, government and industry leaders, as well as senior representatives of other sectors involved, assembled in Yellowknife, and then in Calgary, to describe their positions and viewpoints on Northern hydrocarbon development in the nineties. Their contributions are assembled in the present volume, together with reports of the deliberations of working groups in which a range of topics were discussed by conference participants.

The full title of the conference, Northern Hydrocarbon Development in the Nineties: A Global Perspective, emphasises that the changes taking place in the Canadian North, including the development of oil and gas, have also to be seen in the context of global development. Much has changed since the megaproject proposals of the seventies and more will change before there is large-scale development of hydrocarbon resources in the North.

The Conference was intended to provide an overview of the current situation, an overview that would assist in planning for the next decade. All who attended appreciated the opportunity to hear such well-qualified speakers, and the present volume will bring the collected information to a far wider audience in, as well as outside, Canada. The timing of the Conference, and especially the importance stemming from its topicality, have led to suggestions that similar conferences, and publications, will be needed as the decade proceeds - and change continues. In any case, it is clear that the distinguished contributors to this volume have collectively given a clear, direct and living picture of the North at this time, a work both easily read yet highly authoritative.

As Chairman of the Steering Committee for the Conference, I express our sincere thanks for the help we have received from our contributors in the preparation of this volume. I must thank, too, the Steering Committee members themselves for the major role they played. The Secretariat for the Conference was located at Carleton University, and we hope that the Conference and this volume demonstrate the role that universities, quite properly, can play in collecting and spreading knowledge of a very topical and practical kind - in this case, knowledge of the fascinating, least-understood, yet arguably most rapidly developing part of Canada.

Peter J. Williams
Chairman, Steering Committee

WELCOME ADDRESS

(given in Yellowknife, 30 September)

John H. Parker
Commissioner
Northwest Territories

I am pleased to welcome visitors from outside the Northwest Territories and, of course, people who are from communities within the Territories to this conference.

This conference is strongly sponsored by two levels of government and by representatives of industry. I think we have here a good cross-section of people to deal with the subject of Northern Hydrocarbon Development in the Nineties. I'd like, right at the outset, to offer special credit to Carleton University and their people for the organizational work and for the concept of this conference.

It's absolutely essential to take a global perspective in dealing with oil and gas. We cannot enjoy the luxury of a national view in the searching for, and the production of, these vital elements. Producing countries around the world are sharply competitive. The world market itself is a sharply competitive market. There's great volatility to that market, because, in particular, of the various political situations that exist in the Middle East countries. That is one of the principle reasons why a global perspective is important and why Canada must understand the global politics involved. On top of all that, we're dealing with a diminishing resource. While at the present time it doesn't seem that that's the case, in the long run, it certainly is a diminishing resource.

In Canada, due to the position taken by various levels of government, principally the federal government, we're dealing with what I often refer to as 'political oil' and the assistance that is offered makes a big difference in the production schedule and the exploration schedule for oil in various parts of our country, and that's something that all of us here have to be cognizant of. The level of government support and the changes that it brings to the economics of oil production are very, very important and it had best be understood whether Hibernia receives more support, whether Beaufort receives some support, whether heavy oil, or whatever, receives support isn't decided only on technical merits.

The conference objectives that you're faced with today are very good. They permit an exchange of information which, of course, consists of hard facts and very best guesses. We are being given the opportunity to review the developmental options and that should result in much better preparation for decision-making, both by government and by industry, placed in a realistic framework.

The Government of the Northwest Territories brings some real strengths to this debate, in my view, and the Honourable Dennis Patterson will undoubtedly address some of those in some detail. But first of all our government's relationship with native people, while it does have its ups and downs, is basically very strong and very understanding because the government to

a great extent represents, and is representative of, the racial mix within our part of the country. We are proud of the native people who take full part in our government and that is a great strength for industry to note.

We are also leaders in wildlife management in the whole renewable resource sector. One of the people speaking this morning, Jim Bourque, has international stature as our Deputy Minister of Renewable Resources and his work with the Fur Institute, the Convention on International Trade and Endangered Species and so forth, indicates that the Territories is in a position of leadership in this area. This relates very much to the eventual development and production of oil and gas in the North.

The land claims process is another important topic that will be discussed. I think that this very important step of the agreement-in-principal having been signed means that there is some certainty being brought to the whole discussion and companies and governments can now see a target for proceeding with developments - careful and cautious developments, but still developments. The aboriginal groups have been dealt into the game, as it were, by the agreement-in-principle. It's essential that all of us recognize these groups as the serious players that they have become because they will be interested, and clearly are interested in taking part in developments which will be available to them.

So, with the northern elements that can be added from this end of the country together with the expertise that many of you bring to this conference, I'm confident that you will be dealing with an excellent and very important agenda and I wish you every success and thank all of you for coming to Yellowknife for this important work.

CHAPTER 1

UNDERSTANDING CANADA'S NORTH

1.1 DEFINING CANADA'S NORTH

James Bourque
Deputy Minister
Department of Renewable Resources
Government of the Northwest Territories

I was asked to title my speech Defining Canada's North. I don't think it is possible to come up with a single definition because the North means so many different things to different people. For example, perceptions of the geography of North and South are often different depending on where you live. To people living in Grise Fiord or Sachs Harbour, Yellowknife is considered 'South' not 'North'.

To properly 'see' the Northwest Territories, try to forget the typical map of Canada and imagine seeing this country from above the North Pole. It gives you a much different perspective. You're looking at one third of Canada's land mass and a large portion of its freshwater. The North contains three broad zones. The **High Arctic** is the northern archipelago and surrounding seas. The **Low Arctic** is the mainland tundra, including the coastal ocean south to the limit of trees. The **Subarctic** is the zone of tension between the tundra and the spruce forest - a land of small scattered trees and muskeg. To some, the North is represented by the wildlife (the wolf, the caribou, the polar bear); to others it is the people (an Inuit seal hunter; a Dene trapper); to most it is the land and the ocean itself, the mountains and lakes, the forests and tundra, the pack ice. Whatever your stereotype of the North, it is bound to be limited by your own cultural and socio-economic background. The fact is that the North is as diverse as people's perceptions of it. This diversity is reflected in our natural environment and in our social, cultural and economic environments. I hope to convey to you today that we are using this diversity as a basis upon which to build adaptive resource management regimes, a stable land claims environment, a sound policy base and a strong government with a clear direction for the 1990s.

THE NATURAL, SOCIAL AND POLITICAL SETTING

The Northwest Territories occupies 3.5 million square kilometres of forest, lake, tundra and mountains. The conditions are harsh and the productivity of the land and inland waters is low. Yet the diverse array of habitats provides a base for one of the largest assemblages of free-ranging wildlife in the world. These include caribou, muskox, moose, grizzly and black bear, furbearers and waterfowl. Much of the Arctic is a very productive marine environment, with marine invertebrates and fish supporting walrus, seals, whales and polar bears. Contrasting with the richness in marine and terrestrial wildlife in the North is a low human population density, one of the lowest in North America. The population of the Northwest Territories for example, is approximately 52,000. That's 0.00007% of the population of India which encompasses a similar land mass. Sixty percent of our population is native in origin.

Yellowknife is not typical of the North. The majority of settlements are small, remote communities distributed along coastal areas and lake and river systems. This pattern of settlement is dictated largely by the availability of wildlife. In contrast to southern Canada, the livelihood and culture of many Northwest Territories residents, particularly the native people,

are dependent upon opportunities to hunt, trap and fish. Fish and wildlife provide not only subsistence but also supplemental cash income from the sale of wildlife products. In many communities far removed from non-renewable resource development opportunities, wildlife-based activities provide the sole economic option.

The political situation in the Northwest Territories is very different from other parts of Canada. Our government is unique in that it is based on consensus decision-making, public participation and consultation rather than party politics. The federal government still retains regulatory authority over most of the land and water. Aside from the management of wildlife and forests, the Government of the Northwest Territories has limited legal authority over resource management and environmental protection. However, the ongoing process of devolution is transferring more of the management responsibility for natural resources to the territorial government. Thus, we are continually moving towards a government with many provincial-like powers and responsibilities. This will provide the territorial government with a stronger legislative and regulatory basis to manage renewable and non-renewable resources, including oil and gas.

The coming decade should see the settlement of land claims in the Northwest Territories. The Inuvialuit Final Agreement is now being implemented. An agreement-in-principle for the Dene-Metis land claim was just signed recently. Future settlement of this claim, and the outstanding land claim by the Inuit of the eastern Arctic will be historic developments in the Northwest Territories. These will result in guaranteed native participation in resource management and help chart a 'northern-made' course for our future.

The Northwest Territories is rich in renewable and non-renewable resources. One goal of the Government of the Northwest Territories is to increase self-sufficiency and stabilize local economies. In order to accomplish this task, a broad foundation for economic growth is required. Thus we are now focussing on diversifying and expanding economic opportunities in the renewable resources sector of the economy. But we cannot talk about 'defining Canada's North' without talking about hydrocarbon development because our economic base up here has been, for many years, non-renewable resources - minerals, oil and natural gas.

HYDROCARBON DEVELOPMENT IN THE NORTH

In order to set the direction for the 1990s, we should first reflect on the past two decades. I wish to mention briefly a few of the political and economic highlights of northern hydrocarbon development during the last twenty years. In 1968, when the 'northern vision' of Diefenbaker days was well established, oil and gas in large quantities were discovered in Prudhoe Bay, Alaska. There were subsequent discoveries in the Yukon and Northwest Territories, including finds in the high Arctic Islands and offshore in the Beaufort Sea.

Political impetus from Ottawa and OPEC plus the so-called 'energy crisis' created an oil and gas 'stampede'. In 1968, the federal government struck a task force on northern development and the National Energy Board opened discussions with private corporations to talk about developing the oil and gas fields. So great was the perceived need to extract the resource and transport it south that in 1970, a set of federal guidelines for the building of northern pipelines was issued - in total absence of public consultation in any part of the country. The

Inuit were completely ignored. That year the Inuvialuit of the Delta region formed the Committee for Original People's Entitlement (COPE) and in 1971, they joined together with Inuit from across the North to form the Inuit Tapirisat of Canada (ITC).

By the end of April 1970, the federal government had issued almost 10,000 permits and over 400 leases on 457 million acres in the Northwest Territories and the Yukon - without public consultation. In 1974, the federal government granted Dome Petroleum approval to do exploratory drilling offshore in the Beaufort Sea. Drilling began in 1976 and continued through 1980 even though our knowledge of the environmental impacts was quite rudimentary. At that time, there was also the now famous Berger Inquiry which forced all Canadians to try to come to grips with a spectrum of northern issues. Berger recommended a 10 year moratorium on building pipelines in the North. Ten years later, we had our first pipeline - Norman Wells.

The Norman Wells Oilfield Expansion and Pipeline Project was the largest privately built project in the Northwest Territories and it helped the Government of the Northwest Territories tremendously in clarifying its mandate in assessing impacts of such large developments. From the federal Environmental Assessment and Review Process in 1980 to post-construction monitoring in 1986, the Government of the Northwest Territories took an active role in the project. Prior to 1980, we had little experience with large scale development projects. But through participating in the Environmental Assessment Review Process and the National Energy Board hearings, we realized what an important role our government could play in working with developers to achieve high standards of environmental protection for such projects.

We reviewed impact assessments of the Norman Wells Project; provided input into project permits, authorizations, licenses and agreements; sat on interdepartmental and interjurisdictional committees; conducted surveillance and enforcement activities and impact monitoring studies; conducted community consultations and reviewed renewable resource compensation claims and responded to environmental emergencies. It was a major learning experience. The Government of the Northwest Territories produced a report entitled, An Evaluation of the Norman Wells Project, which included 47 recommendations for an environmental assessment process for oil and gas developments in the Northwest Territories.

For example, it was determined that the territorial and federal governments had to come to a clearer understanding of roles and responsibilities for responding to environmental emergencies such as fuel or chemical spills. Since then, the two governments have signed a Working Agreement on Government Response to Spills in the NWT. It was also recommended that a regional land use planning commission be established for the Mackenzie Valley and a land use plan be prepared. This recommendation is now being made into reality.

Another thing we have learned first-hand in the last 20 years is that an economy based on non-renewable resources such as minerals, oil and natural gas is very volatile and prone to the social and economic ills that accompany the boom-bust cycle. World prices rise and fall. Communities based on resource extraction prosper and fade. Pine Point is a recent example of the total closure of a single industry community.

GNWT APPROACH TO HYDROCARBON DEVELOPMENT IN THE 1990s

It appears now that we are on the verge of another prosperous period in the cycle, particularly, with the proposed development of the Amauligak field in the Beaufort Sea and its associated pipeline. In fact, the coming decade (which is the focal point of this conference) is expected to be one of intense mining and oil and gas activity.

We have come a long way since the late sixties and early seventies in our attitudes towards northern hydrocarbon development. In those days, things were happening so quickly on the national and international fronts, that our northern policy-making could not catch up with rapid political and economic developments. That has now changed.

We are now developing policies to integrate resource development with conservation. It now appears that the concept of sustainable development will soon become the cornerstone of resource planning and policy processes throughout the governments of the western world. For our own purposes, we have defined sustainable development as a form of social and economic growth which harmonizes conservation and development goals. Industry has a specific and necessary role to play in this process by promoting continued private sector economic activity and development on a sustainable basis. Environmental conservation and economic development not only can co-exist, they must co-exist, for one is a condition of the other.

In the 1990s, the role of the Government of the Northwest Territories is to provide the foundation for the growth of individuals and businesses and to foster a climate which will encourage that growth. In the next decade, the Government of the Northwest Territories will break down barriers to economic development by focussing on northern control of energy, improving the northern transportation network, re-shaping financial support to business, and directing government spending, especially for construction projects, so that it helps build local economies.

Having Northerners take over control of Northwest Territories' energy resources and their development for the federal government is one of our major objectives. Of great long-term importance will be the Northern Energy Accord which will allow our government to manage oil and gas activities in the same way as provincial governments.

Non-renewable resources will be an important part of the Northwest Territories economy. Northerners must be ready to take advantage of projects as they materialize in the next decade. We want to be prepared for future pipelines and other large-scale developments. Our ability to do this will depend on negotiating the Northern Energy Accord with the federal government.

The territorial government is working closely with the Government of Canada and its agencies, through such forums as the Regional Environmental Review Committee, in the environmental assessment of development projects. In anticipation of accelerated development in the coming decade, we now have a draft paper outlining a Government of the Northwest Territories screening and impact assessment process.

The guiding principles produced by recent major studies such as The World Conservation Strategy and The World Commission on Environment and Development have been incorporated in a Northwest Territories Conservation Policy which we are developing. The policy has been developed through a variety of government and public forums, including a wide spectrum of conservation and development interests. This consultation is not over and you will no doubt be hearing more about this policy and its overriding goal of sustainable development.

Developments in the non-renewable resource sector will affect the rights of aboriginal people in land and resources. Thus, aboriginal organizations have been negotiating and defining their

role in public management regimes. In the 1990s, a new resource management administration will emerge - one that is uniquely adapted to the economy, culture and environment of the North.

A new era of environmentally sound economic development, a full partnership of governments, industry, non-government organizations and the general public must guide us through a new approach to conservation and development in the Northwest Territories. Environmental organizations will continue to fulfill an important role as advocates for conservation. Governments and industry, however, must develop and assume new responsibilities to successfully maintain environmental standards in economic planning.

It is now evident that our changing and developing North consists of a traditional element based on renewable resources and an industrial element based on non-renewable resources. Fragile, productive ecosystems and mineral and hydrocarbon deposits hold the key to our future. However, the long-term stability of the economy will depend on balanced and sustainable development as we strive for economic self-sufficiency in the Northwest Territories.

An agreement-in-principle for the Northern Energy Accord has recently been signed and paves the way for the phased transfer, from the Government of Canada to the Government of the Northwest Territories, of the administrative and legislative powers to manage onshore oil and gas resources, and co-manage offshore reserves in the Northwest Territories.

The 1990s will be a decade of even greater change than the seventies and eighties. The Government of the Northwest Territories is determined to continue building a spirit of co-operation within which we all can work towards a better future. To do this, we need the support and involvement of the Government of Canada, the Northwest Territories' aboriginal organizations, the private sector (particularly, the oil and gas industry) and, most importantly of all, the citizens of the Northwest Territories.

CONCLUSION

In order to convey to you the highly diverse natural, cultural, socio-economic and political environment of the Northwest Territories, I have had to use a broad brush in painting this picture of Canada's North. I have tried to refresh our minds with the development activities and experiences of the past and to accurately describe the present situation in the North as regards hydrocarbon development. With the past and present put into perspective, I have tried to project a direction for the 1990s.

Throughout the changes that will occur and the challenges that will confront all of us in the 1990s, the Government of the Northwest Territories will ensure that our economic self-sufficiency is increased, that aboriginal rights and interests are protected and that the political development of the Northwest Territories continues to advance.

We are working steadily towards a strong provincial-type government, a stable land claims environment with full native participation in resource management, a sound policy base and a co-operative approach to the achievement of sustainable development.

1.2 NORTHERN CONSTITUTIONAL DEVELOPMENT:
NORTHWEST TERRITORIAL PERSPECTIVE

The Honourable Dennis Patterson
Government Leader
Government of the Northwest Territories

You've asked me to address constitutional development in the Northwest Territories. That's like asking me to hit a moving target. For those of us who live here, political and constitutional development in the NWT, particularly over the last fifteen years, has been rapid and exciting.

Less than a month ago (September 1988), I had the honour of signing an agreement with Prime Minister Brian Mulroney that will enable our two governments to begin negotiating towards a Northern Energy Accord. The Accord will see Northerners and their government managing the development of our oil and gas resources. It will be a major step forward in our constitutional evolution. Perhaps you will better appreciate the significance of the Accord to Northerners if I give you some of the historical context in which it is taking place.

In historical and constitutional terms, at least to those who have ruled us for the last hundred years or so, the Northwest Territories is what's left over when you take away the rest of Canada. Before Confederation, much of Canada's North was directly administered by the Hudson's Bay Company. These lands were surrendered to Britain in 1868. In 1870, the "North-West Territories" of the day were admitted to the Dominion of Canada by Imperial Order-in-Council. The 1870 Order gave Canada's federal parliament authority over an enormous area of land. The "North-West Territories" then included half of Quebec and Ontario, some Arctic Islands, and all of the prairie provinces, Yukon and continental Northwest Territories. The small, scattered groups of native people on the land in the more remote parts of the North probably did not know for some time that they were now governed by Canada.

The federal North-West Territories Act of 1875 established the legal framework for government in the Territories. With amendments, it still stands as the "constitution" of today's Northwest Territories.

By 1888, the "North-West Territories" had a fully-elected, 22-member, legislative assembly. That, however, was the apex of our constitutional development in the nineteenth century. What happened, of course, was that the more organized and populated areas of the "North-West Territories" soon formed new provinces and territories. With the establishment of the provinces of Alberta and Saskatchewan in 1905, the Northwest Territories reverted to colonial status. The NWT Act provided for a government consisting of a commissioner and four appointed councillors, who were to administer the Territories from Ottawa.

It is probably fair to say that the attitude of the Canadian colonial government was one of benign neglect. Little attempt was made to manage or use the more remote areas of the North. Until 1918, the Commissioner of the Royal Canadian Mounted Police acted as the Chief Administrator of the NWT. No councillors were appointed until 1921.

The Northern Energy Accord is far from the first example of hydrocarbon industry involvement in our constitutional progress. The development of Imperial Oil's field at Norman Wells in 1921 prompted not only the signing of Treaty 11 with the Mackenzie Valley Dene, but also the appointment of members to the Territorial Council. That Territorial Council was chaired by the federal Deputy Minister of the Interior. Its members were all senior civil servants. So the Government of the Northwest Territories was, in effect, an interdepartmental committee. The presence of an actual governing body did help to consolidate Canadian sovereignty over the North. Its impact on the local people was minimal. Those of you who are interested in constitutional theory may wish to note that this Council effectively combined the "legislative" and "executive" branches of government. With the participation of the Commissioner it also included the Crown's representative.

This situation prevailed, with some modest improvements, through to the 1960s. Early in that decade, some Mackenzie District residents had proposed division of the Northwest Territories into an eastern and western territory, to expedite political development in the West. This led to the establishment of the Advisory Commission on the Development of Government in the Northwest Territories, chaired by Dean Carrothers. Our present Commissioner, John Parker, was one of the members of the Carrothers Commission. In 1967, as a result of the Commission's recommendations, Yellowknife became the territorial capital and a resident NWT government administration was established.

Under the NWT Act, the Territorial Council's legislative jurisdiction was similar to that of a province. By 1970, a number of major federally-administered programs of a province-like nature, such as education, social services, economic development and municipal affairs, had been transferred to the new territorial administration. The major themes of Northwest Territories political and constitutional development had all become apparent by the early '70s: resource development, aboriginal rights, division, devolution and responsible government.

You may have noticed in my account so far, that I have said little about the wishes of Northerners for constitutional development. That is because, until the Carrothers Commission, no-one really asked them what they wanted. In the early 1970s, the wishes of Northerners began to be articulated more often, and more forcefully, especially by aboriginal people. There were a number of reasons for this. Aboriginal people across Canada formed organizations to fight Jean Chretien's 1969 White Paper advocating the end of the federal government's direct relationship with them. Aboriginal people in the Northwest Territories were no exception. At the same time, hydrocarbon exploration was taking place in the Mackenzie Delta-Beaufort Sea area, and in the Arctic Islands. A large-scale gas pipeline was proposed for the Mackenzie Valley. While many non-aboriginal residents welcomed these developments, aboriginal people felt their interests were threatened.

In 1975, the year I arrived on Baffin Island, the Northwest Territories returned its first fully elected Territorial Council since 1888. This Legislative Assembly, as they called themselves, had a majority of aboriginal members. Three members were given executive portfolios. However, that Eighth Assembly was dominated by members who favoured resource development and the growth of the Northwest Territories Government towards provincehood on traditional southern Canadian lines. To most of the aboriginal people - who form the majority of our population - the Assembly was an alien and illegitimate institution.

In the western NWT, the Berger Inquiry provided a focus for public debate on the Mackenzie Valley pipeline. Judge Berger's report, submitted to the federal government in 1977, recommended that construction be delayed to permit the aboriginal people to settle their land claims and prepare for development.

At the end of the decade, relations between the NWT Government and the aboriginal organizations took a turn for the better. The decisive event was the election, in 1979, of prominent aboriginal leaders and their sympathizers to the Ninth Legislative Assembly. I was, and still am, very proud to have been one of these "young turks". Changes came thick and fast after that, and from all directions. In 1979 division of the NWT again became an issue. Now the impetus was from the Inuit, who wished to establish a public government in Nunavut, their traditional territory. A public plebiscite held throughout the NWT in 1982 resulted in a majority "yes" vote.

In 1980, the Honourable C.M. "Bud" Drury reported to the federal government on constitutional development in the Northwest Territories. Mr. Drury recommended the transfer of further powers to the territorial government - with the interesting exception of control over non-renewable resources. Elected members of the Legislative Assembly were now the majority on the Executive, and selected a leader, the Honourable George Braden.

Meanwhile, back in Ottawa, the federal government was making plans to patriate Canada's constitution and add to it a charter of rights and freedoms. I hope my good friend Mr. Stagg will not mind my saying that there's nothing like a common enemy to bring people together. In what was perhaps its finest hour, the Ninth Legislative Assembly set aside its differences and travelled to Ottawa en masse to lobby for the inclusion of aboriginal rights in the Charter. I believe that this spirit of mutual generosity and united action can still be evoked among us.

The Tenth Legislative Assembly, elected in 1983, made further strides towards responsible government. The Assembly selected the Executive Council, and the Executive took on all the departmental portfolios. The Honourable Richard Nerysoo and the Honourable Nick Sibbeston were our first aboriginal Government Leaders. The Chairmanship of the Executive Council passed to the Government Leader from the Commissioner. Commissioner Parker's role is now similar in practice, if not in law, to that of a provincial Lieutenant-Governor. Progress was made on land claims settlements. In 1984, the Inuvialuit of the Beaufort-Delta signed their final agreement with the federal government. They are now the largest private landowners in the area, and a force to be reckoned with.

The Constitutional Alliance of the Northwest Territories, composed of representatives of the aboriginal people and of our government, worked towards division of the NWT. An agreement was finally reached in Iqaluit in January of 1987 on a boundary and constitutional principles for the new Territories. Unfortunately, the Dene-Metis and the Inuit could not agree on the boundary between their land claims settlement areas at that time. This step was necessary before a boundary plebiscite could be held. The question of division is therefore still before us.

Our government was recognized as a full voting participant in several federal-provincial forums. These included First Ministers' Conferences to define the aboriginal rights protected in the Canadian constitution. These FMCs ended without agreement in 1987. We are, however, very hopeful about the possibility of talks resuming in the not too distant future.

Northerners can, perhaps, be forgiven for believing that our desire to control our own constitutional and political future had been made clear. We also thought that we had come far enough to deserve at least some pro forma consultation when matters affecting us were being discussed. That is why we were so shocked, and felt so terribly betrayed, when the provisions of the Meech Lake Accord were announced. We were still operating on federal promises that parts of the 1982 Constitution Act to which we objected would be discussed and perhaps changed. Now we were told that provincial status for the two northern territories would depend on a unanimous decision of the provincial Premiers and the Prime Minister. These were the same eleven people whose ability to disagree had just been demonstrated to us in the matter of aboriginal rights. Our government, with a gratifying amount of popular support, devoted a great deal of effort to fighting the Meech Lake Accord in the courts and in any other forum we could find.

As claims came closer to settlement, and as Northerners gained more experience with business and industry, attitudes towards development changed. Many of us realized that further constitutional progress would not be meaningful without economic progress.

The territorial election campaign of November 1987 was dominated by economic issues. One of my first duties as the new Government Leader was to make a brief speech to the First Ministers' Conference on the economy. In that speech, I did not dwell on the Meech Lake Accord. Instead, I chose to address the issues of Free Trade and economic self-determination in the Northwest Territories. I told the Premiers frankly that we cannot welcome the benefits of Free Trade with the United States until our people have more of a stake in our own economy. And I told them the best place to start would be with oil and gas management and revenues, through the vehicle of a Northern Energy Accord. Citizens of the Northwest Territories - who are citizens of Canada - are no longer content to be bystanders. My speech did not fall on deaf ears. The government of Prime Minister Brian Mulroney has been very receptive to northern desires for the devolution of Ottawa's remaining province-like powers. We completed the transfer of responsibilities for health services and purchased the Northern Canada Power Commission this winter.

Now, after many decades of dispute, controversy and uncertainty, we are just a few months away from concluding a Northern Energy Accord. The Honourable Nellie Cournoyea will be telling you more about the terms of the Northern Accord Negotiating Agreement.

I can assure you that we are ready to play our part in the orderly development of oil and gas resources for the benefit of Canada as a whole and the Northwest Territories in particular. Our government has proven its ability to handle new responsibilities effectively in all of the recent transfers. As a responsible, fully-elected northern government, on the ground in the North, we know we can do as good a job of managing our resources as the civil servants in Ottawa. In fact, we think we can do better!

The member companies of the Frontier Division of the Canadian Petroleum Association have been patient observers of our Accord efforts. Companies have had to face a complex and ineffective management regime that has operated without northern support and involvement. That's going to change. We fully expect the Accord to bring about a stable, legislative and regulatory environment for the oil and gas industry in the North. I look forward to continuing our dialogue with industry as we enter into more detailed discussions.

We also expect to increase our economic self-sufficiency through the Accord. Governing a territory as large and far-flung as the NWT is a costly business - although, I might add, it does contribute to the establishment of Canadian sovereignty in the Arctic. But we do want to start paying our own way. A portion of the revenues from resource royalties should also be available to the aboriginal people of the North, in settlement of their outstanding claims on lands and waters they have used and occupied for millennia. This is one of two very good reasons we have for desiring the full participation of aboriginal organizations in the preparation of our Accord negotiating positions.

The Dene-Metis have signed an agreement-in-principle on the settlement of their claim. Work is progressing towards the Final Agreement. The Inuit expect to have an AIP next March. Both claimant groups will have oil and gas-related rights and interests stemming from their claims. The Accord will protect these rights. We also expect to involve the Inuvialuit, whose claim was settled without reference to resource royalties. That is because, as landholders, they are a group within the general NWT public with a large interest in the outcome of Accord negotiations. This will also apply to the Dene-Metis and Inuit when their claims are settled.

As Government Leader, I would very much have preferred to consult the aboriginal organizations before deciding to sign the Accord Enabling Document. Matters of such importance move forward best in the North by building consensus and obtaining the agreement of all the affected parties. In this case, with the Prime Minister's visit we had the opportunity of a lifetime to make progress on the Accord, and a very short period of time in which to say yes or no. While consensus is very much our preferred mode of operation, we are a duly elected government with the authority to make such decisions. I am quite ready to answer in the House for this one.

We have discussed oil and gas issues with the Dene-Metis, the Inuvialuit and the Inuit many times over the last year. I have met with representatives of their organizations since the Enabling Document was signed, and I believe we are making progress in meeting their concerns. With the signing of a Northern Accord, we will finally assume our legitimate role in the management of non-renewable resources in the Northwest Territories. It will be a milestone in our evolution towards provincial status.

Last August, I addressed the Annual Conference of Provincial Premiers in Saskatoon. I told them at that time, that with the transfer of renewable and non-renewable resource responsibilities to the North, there would be very little to distinguish between what we do as a territorial government and what they do as provincial governments. I, for one, look forward to that day. Some will call it "provincehood by the back door". I say that as long as it means northern people controlling their own economic and political future, any route is fine by me.

At the Eleventh Legislative Assembly's first session last fall, I was given the responsibility for the management of the government as a whole and for the discipline of the Executive Council. This has brought our government another step closer to provincial-style, cabinet government.

In terms of our future political and constitutional development, we find ourselves at a crossroads. One of our first acts as a government was to develop priorities for our term of office. These were largely economic, in view of our mandate from the electorate.

Now it is time to address the complicated constitutional situation in which we find ourselves. Major questions remain unanswered. How do we protect aboriginal rights, including self-government, within a public government in the Canadian liberal-democratic tradition? Is party politics a prerequisite for accountability? What level of government would have what responsibilities? Is provincehood a real possibility for us? We will be asking some of these questions in the upcoming Legislative Assembly session. The Constitutional Alliance has recently become active again. I hope this joint aboriginal-government group will be proposing some of the answers.

We in the Northwest Territories have the unique opportunity to create a government that meets our needs. The North remains Canada's "unfinished business". It is up to us to show the way ahead. I know we have the support of all Northerners, and indeed of all Canadians, in this vitally important task.

1.3 NORTHERN CONSTITUTIONAL DEVELOPMENT: FEDERAL PERSPECTIVE

Jack Stagg
Director General
Constitutional Development and Strategic Planning Branch
Department of Indian and Northern Affairs

As Mr. Patterson has already outlined, a great deal has been accomplished in the North during the past few years. Many of the larger and important programs have been transferred. Considerable progress has been achieved towards the settlement of comprehensive native claims, both here and in the Yukon.

What I would like to do is to share with you my view of the significance of these accomplishments, and of northern constitutional development generally, from the perspective of a southern Canadian - albeit someone who works as a bureaucrat on northern issues - and someone who has had the privilege of spending more time in the North than most other Canadians.

As Mr. Patterson has emphasized, the federal commitment to transfer legislative jurisdiction for oil and gas onshore and to share decision-making with the Territories on offshore development - a Northern Accord - is a very significant and profound event indeed. In Ottawa, I can assure you, it received considerably more attention, for instance, than the transfer of forestry management.

A Northern Accord is not only "significant" and "profound" for what it does to the political and constitutional profile of the Territories in this important resource sector. It is "significant" and "profound" in that it provides the Territories real control, involvement and authority in the energy future of Canada. For me as well as for many others who were and are supportive of the idea of moving more and more real decision-making north, this was the real acid test. It is relatively easy to say that the Territories should run their own health-care system or their own hydro-electric facilities and to transfer these programs northward (I hope those on both sides of the table who handled the negotiations will forgive me this statement). But it is quite another case altogether to propose that the Territories should control the development of resources that, sometime in the future, will undoubtedly affect directly the lives of those living below the 60th Parallel. The Accord may prove to be one of the most important instruments, as the Prime Minister referred to it here recently, in providing the Territories with a major voice in the economic and political life of the entire country.

The Accord, while providing what I think most would agree to be important progress in the political and constitutional evolution of the Territories, also makes good sound business sense. It was a very simple idea whose time had come. Transferring greater responsibility for hydrocarbon resource development to the Territories will ultimately increase the economic self-sufficiency of the Territories. It will also provide Northerners who will be most closely affected by oil and gas development with a real stake-hold in such development through the provision of oil and gas revenues. If one looks southward to Alberta's experience, the oil and gas infrastructure that was slowly built up over a thirty to forty year period occurred, in part, because the people, collectively in that province, had a real economic interest in seeing it

happen. In the early 70s when the cost of energy increased dramatically, Alberta was in a position to take full economic benefit from such a situation. I'm not saying that pattern will repeat itself here, and I'm aware that current market projections are not enthusiastic for significant northern oil and gas development, but the main point is that the Accord will put the pace and timing of development and how it will proceed, when market conditions are right, in the hands of those whose lives it will affect most and who may have the most to gain.

The transfer of provincial style programs and authorities north, although the most immediate and tangible demonstration of increasing political control by Northerners over their own future, is only one of several important initiatives now going on within the general context of broad constitutional development of the Territories. The agreement-in-principle reached in the Dene-Metis comprehensive land claim will, when full and final settlement is reached, provide constitutional guarantees of rights, benefits and a special enduring role for Dene-Metis people in the life of the NWT. Steady progress is also being made towards settlement of the Tungavik Federation of Nunavut (TFN) comprehensive claim in the eastern Arctic. The Constitutional Alliance process has begun again to foster debate and contribute ideas on a wide range of constitutionally-related subjects.

When I try to explain to my fellow southern Canadians what has been and is taking place in the Territories, politically and constitutionally, they don't have quite the same enthusiasm as I do. It's normally not quite enough to pull them away from an Edmonton Oilers game for an hour or so - though it might be this year. It's not that northern constitutional development isn't interesting, it's just that in the South constitutional development there, and what most southern Canadians have learned in school, is quite predictable and frankly quite boring. The historical development in the South, put in its simplest terms, followed a very familiar and repetitive pattern. First came exploration, then came what were known as the Indian commissioners to sign treaties with native peoples (some, of course, will say in retrospect that such treaties were unfair and exploitive), then came settlement, then provincehood and, finally, economic development. It was a rhythm or pattern that repeated itself from the centre of the country westward to the Pacific. Outside of the odd constitutional skirmish between English and French Canada - that was it: here, as Northerners know well, things aren't quite so simple or straightforward. To a very large degree, economic development and settlement have preceded the other important element - a final and equitable agreement with the region's aboriginal peoples. Also, as the GNWT is demanding and getting more provincial-type authority and control, there is a still lively and continuing debate as to whether or not the NWT should be one territory or two. Finally we have promised action to native peoples on Indian self-government. For most southern Canadians who will listen long enough to hear about all of this, it's a matter of trading boredom for confusion. What is happening in the North is not consistent with their own experience in dealing with such things. The old rhythm and familiar pattern is not there.

What I'm saying, of course, is what many of us have realized by experience or instinct - that the North is different - it is unique and will continue to be so. The complexities of what might broadly be taken as northern constitutional development present real challenges to both northern and federal politicians and bureaucrats to make as much progress as we can, collectively, on the widest range of issues. It's what makes this task so difficult and probably what keeps so many of us in the business.

1.4 EVOLVING LAND CLAIMS: FEDERAL VIEWS

L. Fraikin
Director General
Comprehensive Claims Branch
Indian and Northern Affairs Canada

I would like to talk to you about what I've been concerned about for the last 3 years if not for the last 7 years. There have been some major developments in claims settlements and I think part of the progress that we're seeing now and what we've just witnessed with the signing of the agreement-in-principle in September with the Dene-Metis certainly is important evidence that the policy of negotiating land claims is working.

I'm not a historian but I am going to try to at least bring you up to scratch in terms of why we are in this business in the first place, what's happened, and what has and hasn't worked in the last 15 years.

Actually, the federal government did not really think it would ever be faced with comprehensive land claims from native peoples. And certainly, in the late 60s, early 70s, negotiation with native groups over land title was not the intention. The Calder case that some of you may be familiar with, in which the Nisga'a of the Naas Valley in B.C. brought the issues of continued unextinguished aboriginal title to the Supreme Court, changed all that. In 1973, the Supreme Court, although it threw out the case on a technicality, nevertheless acknowledged that aboriginal title did exist and split evenly on the fact as to whether or not it remained in existence in the Naas Valley.

The federal government responded quickly to the decision and brought out its first comprehensive claims policy to deal with the issue through negotiations. Again, if you look at what is at stake, generally speaking, court cases are not the best route to resolve such rather comprehensive issues as aboriginal title and extinguishment or exchange of aboriginal title for certain other benefits. As I said, therefore, in '73, the federal government announced its comprehensive claims policy noting that it was prepared to negotiate settlements with native people based on unextinguished title in areas which native peoples had traditionally used and had not taken treaty and where they continued to use the land to this day. Why then, was one of the first native claims accepted for negotiation from the Dene-Metis in the Mackenzie Valley?

Certainly, there have been treaties signed; Treaty 8 and Treaty 11 were signed in the late 1800s and in 1921. The federal government still maintains that these treaties are sound treaties and are legal treaties. The native parties, however, argued in court that the treaties were not really what the government meant them to be. Again the case was thrown out on a technicality. At best we have, therefore, in this instance an issue on which we have conflicting testimony. Add to this the fact that the government failed to implement the land-related provisions of the treaties, so consequently, the government in 1976 accepted the Dene and Metis claims for negotiation as it did, shortly thereafter, with the Inuit of the central and eastern Arctic and the Inuvialuit of the western Arctic. The Yukon Indians had also presented a claim in 1974 which was accepted for negotiation.

At the same time, and I think it is worthwhile to note, although it is not so much a northern issue, there was the court imposed negotiation process in the James Bay territory in Quebec. Two claims were negotiated very rapidly and in fact were negotiated in 2 years and legislated up to 10 years later. I think part of the problems we're encountering in those settlements has to do with the speed with which those two agreements were negotiated. Also, less than clear and precise language was used in some of the clauses. That may also be the heritage that we face in Dene-Metis country or in the valley here in terms of the old treaties, where we certainly have a difference of opinion in terms of what they say and mean exactly.

Consequently, we now have a national policy regarding the settlement of land claims that is fairly broad, and to say the least, a lot less prescriptive than the old treaties were. There are some sound reasons for this and indirectly, speakers this morning, touched upon it in the sense that they talked about a territory with a vastly changing environment and inhabited by peoples with very different value systems who are still working out their cohabitation, both with the federal government as well as between natives and non-natives in the territory.

Indeed, to have a land claims policy that gives very specific guidelines tends to be counter-productive. We are dealing with different native peoples. We are dealing with aboriginal people who wish different things, for their own society and their own communities. Consequently, it makes sense to have, for once, a federal policy that is expressly made to take account of regional differentiations and regional lifestyles.

If we look at the settlements that were finalized between 1973 and 1984, you see that they are different in the benefits and the provisions that the various native peoples negotiated with the federal government and, in certain cases, also with the provincial government. I make no excuses therefore for a policy that is somewhat vague and that probably gives enormous discomfort to a lot of people. Many bureaucrats and even my negotiators at times say "gee, if somebody would just clarify what we are really supposed to negotiate, it would be simpler". Indeed, it would be a lot simpler but we would never have any deals.

In 1984, we negotiated an agreement-in-principle with the Yukon Indians. However, when it came time to have the AIP ratified by their communities, they didn't ratify. This was a deal that I believe we all thought was a workable deal in the Yukon. It certainly had been worked out in great detail between two levels of governments and the native negotiators at the table over a 10 year period. It, therefore, came as a shock, if not a total surprise, that it wasn't ratified by the native parties. That instance, as well as the fact that since 1982, land claim settlement provisions received constitutional protection, brought the new government to review the policy in 1984.

The first amendment, and to date, the only amendment to the constitution which deals with aboriginal affairs is the fact that land claims agreements are protected as are treaties under the Canadian constitution. Consequently, you have to be very careful what goes in there and what doesn't go in these agreements.

Certainly, for instance, I think it's no state secret to say that we are still looking at the Cree and Inuit of northeastern Quebec deals, or the James Bay Agreement, with some trepidation, realizing that those provisions are now constitutionally protected. We may have done things differently had we known that this was coming. We therefore reviewed the existing policy in 1984. The Cooligan Task Force finished its review in December 1985, its report was published

in March 1986, and the government announced its new policy in December 1986. We therefore have been working with a new policy and, I think, the changes brought to the policy will make deals a little bit easier to negotiate.

First of all, we have relaxed our requirement that all aboriginal rights must be extinguished. We also have a very different view of what roles the native people can play in renewable resources and in the management and control of renewable resources. The policy now allows us to negotiate decision-making participation in the management of renewable resources. This can occur in a variety of ways, but previously it could only be an advisory or consultative role and not a role in the decision-making process. That certainly has brought the settlements, particularly in the North, much closer to an acceptable solution.

We're all after something that, I think, the industry has been clamouring for. We're after certainty over the use and disposition of the land. The native people are after certainty in that they wish to have guarantees that they will have a say in what happens on the land and how it will impact on their way of life. They wish to preserve their way of life and their values while at the same time being able to participate in development decisions. It, at best, has a history of not being an easy achievement, and certainly when we sit across from the Dene-Metis or from the Tungavik Federation of Nunavut (TFN) at the negotiation table, we start with very different views on how we can best make a deal on their participation in renewable resource management.

I'm glad to say that we are coming close to a deal both in the Council for Yukon Indians (CYI) and in the Dene-Metis negotiations, and progress continues to be made at the TFN negotiation table regarding a settlement in the central and eastern Arctic. The work is long. And, we will never be clearly able to tell with absolute certainty what a deal will mean in 5 or 10 years from now. That's one of the hang-ups and one of the difficulties of making settlements of this kind with the native peoples. Also, because here in the North the whole societal backdrop changes and has been changing so fast, and will continue to change over the next decades. Consequently, both on the native side as well as on the government side, we try to look ahead as much as possible in defining the best provisions, the best benefits, the best participation and the best institutional structures that you can come up with to ensure, on the one hand, some flexibility for later on if the institutions or structures prove to be counter-productive, and at the same time, for the native parties particularly, to ensure that the principles underlying these structures are definitely and clearly set out so that even if the structures need to change, the principles under which they were negotiated are adhered to.

I should say that it is different and a much more difficult process to go through South of 60. We have some 22 claims from aboriginal people in British Columbia, Quebec and Labrador. Generally, there is a lot more disposition and/or use of the land in these claim areas than in areas here. We have just reached a framework agreement with the Conseil Attikamek Montagnais (CAM) in Quebec. The Montagnais and Attikamek people occupy the north shore and part of central Quebec. The framework agreement in essence lays down the rules of the game that that particular negotiation table will use to come to an agreement-in-principle and a final agreement.

Another positive policy change that was brought in by Mr. McKnight is in the process. Rather than simply say "let's negotiate" and basically start without any prerequirements, we have brought more discipline to the process by setting timeframes and identifying what can be negotiated. This may make us a little bit more uncomfortable on both sides of the table, but

probably pushes us to move within the timeframes given towards a solution. Certainly, the Minister felt that negotiating for another 10 years wasn't going anywhere, so right now when we start negotiating with a new partner or with a new native party we make sure that we have the province/territory on side in terms of a participating party and we also make sure that we start by negotiating a framework agreement which basically sets down the topics and the hows and the whys of what we will be negotiating. For instance, with the Nisga'a, we are going back to that as we have with CAM. We hope that a lot of the problems due to initial misconceptions that I have seen cropping up in the northern claims may be avoided because they would be coming forward now at the start of negotiations. These problems are largely due because of our different visions of what we want and some of the ways of how we're going to deal with each other at the table are basically being set at the framework agreement. Consequently, I would expect and would venture to say that we won't have situations where we have framework agreements with native parties which don't end up in an agreement-in-principle because all of a sudden we find one party is unwilling to ratify the deal. I think we will find either right at the beginning that we can't deal or we will find very early on in the game that we're just too far apart and there's no deal to be made here. So, I think in that sense, we have certainly improved the process.

The policy remains very broad and that, I think, is simply because, as I said before, we have various geographies, various native parties and various native lifestyles and values that we have to work with. I believe, that the broader the policy you have to work with is, the more likely it is that you will have a deal that will satisfy both governments as well as the native parties.

Can I give you any comfort in terms of the likelihood that between now and years from now we will have a settlement in the Mackenzie Valley? I would say we certainly have resolved most of the deal breakers on the table so far. We certainly have gone a long way in defining the Dene-Metis role in controlling and management renewable resources, in wildlife harvesting and in the land. We have dealt with the financial aspects of the settlement. So, we are on the way to a final deal. I think it's very important that both the native and non-native population become aware of what the agreement-in-principle is all about. We will make the agreement-in-principle publicly available shortly so that both you as well as the native people can get better acquainted with it and they can make your views known as to what may and may not be particularly acceptable or not acceptable. The other areas where further work needs to be done is in the land selections and as you will see in the agreement-in-principle with the Dene-Metis, there are certain areas where clauses need to be clarified and specifications need to be added. Ted Moses, who at the time was the Grand Chief of the Cree, said to the Dene-Metis when they were reviewing the agreement-in-principle, "I learned a lesson through the years of negotiating with the government after the James Bay Agreement was signed. If you are going to deal with government in this kind of deal, make it as clear as possible and make sure that the wording says exactly what you want to say." I think it's a lesson that the government has also learned through its dealing with the same agreement in the last 10 years. Certainly there remains a lot of clarifications and preciseness to be negotiated to get us to the final deal. But, I think we're making real progress and I think over the next 3 years we will achieve our end result, final land claim settlements with the Dene-Metis, the Council for Yukon Indians and the Inuit of the central and eastern Arctic.

William Erasmus
President
Dene Nation

The Dene-Metis are quite concerned about oil and gas and the question of resources, because we know when we talk of oil and gas it brings all kinds of dollar signs before people and the world revolves around money these days. So, we have to set the rules straight and we're quite concerned, as to how the rules ought to apply, who should put them in place and really what kind of a future we are going to have in the North. As you are aware a Northern Accord signing took place in September 1988 and the Dene-Metis didn't really make much of a statement against the process; however, we find ourselves in a situation where we're told that we're to be part of a team approach with government so that we can all work on putting a package together and developing a better situation in the North. At the same time, the agreement is signed without us really being fully involved and, without putting blame on people, I think it is something that has happened and the question now is how do we sit down and how do we develop from here. In other words, it's not too late for us to look at the Accord, it's not too late to look at the agreement and make the two mesh and I think if you've been listening to the news in the North, you've probably heard my good friend Roger Gruben making more noise about the Northern Accord than I have; however, my opinions don't vary much from Roger's.

Our intent is to sit down with government and really work out what the new rules are going to be. We, in signing our agreement-in-principle, on September 5th, 1988 entered into the agreement with the understanding that the first thing that we would do, would be to develop an interim protection agreement between ourselves and the government. In other words, the land, as we negotiate, must be protected. The land cannot be left totally wide open. We are looking towards development, we are looking towards having an orderly structure evolve in the North, so that people in the North benefit whether they're Dene, Metis, Inuvialuit, Inuit, or non-aboriginal. Basically in the North we're looking at a situation where we'd like the North to develop and be recognized as a situation that has to be similar to the rest of the country. In other words, there's no reason why we cannot evolve as a provincial-type jurisdiction in the North.

In order to get to that stage, our lands, while we negotiate, have to be protected. We have a moratorium. Our position is that the moratorium ought to stay in place. Our understanding when it was put in place was that it would stay there until our final agreement was signed. Our final agreement won't be signed for another two years and if that's the case when we're looking at the rest of the lands, how do we protect the other lands without totally stopping development? That's the question, because we're not trying to stop development.

How do we set rules in place so that oil companies can come north, and industry can come north, and benefit from what we have here? At the same time, allowing the people in the communities and in the regions to benefit. Also let's not only look at it as an economic question, because it's much more than economics. When you begin to look at the North, you must recognize that we're people, we have nowhere else to go, we don't want to go south; it's not where we come from. It's a nice place to visit, it's a nice place to be acquainted with,

but, we're not from the South and we intend to stay here. So, how do we, with the rest of the country, work out a unique situation that will recognize that we have special cultural rights, we have our own language, we have a different world view, and that people in our communities are able to make decisions that directly affect them? And so, the simple question is, how do the aboriginal people, and how does the government, come together in a spirit of nation-building and a spirit of cooperation where the government says, "finally in our history, we are able to sit down with aboriginal people because the aboriginal people are a majority, because they use the land traditionally and because they've demonstrated they have an interest"? How can we achieve that?

That's our way of entering Confederation, if you will. We're entering Confederation because the treaties that were mentioned were friendship treaties on our part. My good friend, Liz Fraikin, mentioned we have varying opinions. It's true, we have varying opinions. On the one hand, the federal government says we abolished, we extinguished, we gave up whatever rights we had, whatever aboriginal rights we had. Our interpretation is that we didn't give up any rights whatsoever. The only thing we did was that we acknowledged that other people were coming on to our land so we had our hands open and said "yes, we have lots of land; come on our land." We didn't say, however, that we were going to give up our right to make our own decisions over our own lives, to have our own institutions so that we can continue to survive as a unique people. So, that has to be worked out. We can no longer say, "yes, we sympathize with you, you have a good point, yes, the country must develop, the country must grow". We must go further than that. We have to take the next step. We have to say "let's be serious about it". Obviously, the aboriginal people know what you're talking about. I'd like to think the government knows what it's talking about on the point. If that's the case, then spend the money and time necessary, and settle this question of aboriginal rights. The opportunities to do so are here in the North. In the South you can't do this because you have a situation where Indian people are already on the reserves. They're on small parcels of land. They can no longer have a great influence over the lands surrounding them. So, while the opportunity is here, let's do it. Let's do it in the North where we're walking into an election. I hope it's not like when Trudeau kept on telling us, "it's going to be next month, it's going to be next month", and it never happened until 8 months later and we all lived through a nightmare in 1973 and 1974. I'm hoping it's going to be soon, and I'm hoping this question could be addressed and it can be an election issue so that we in the North can say we cooperated with industry and government and that aboriginal people sat down, in the best interests of everyone and said "these are the new rules, we all know them, regardless of who owns the land we're going to follow them". I really believe that it can be done.

The Yukon Indians are not too far behind us, nor are the Tungavik Federation of Nunavut (TFN) and the Inuit in the East. So, as each day goes by, we're developing more and more of an approach as to how it ought to be settled. We're prepared to talk to industry. We've been approached a great deal in the last while because we finally signed our agreement-in-principle. However, we have not decided exactly how we are going to work with industry, exactly how our final agreement is going to be. That'll take another 2 years. But, the main question is interim protection. To reassure you that we are not going into negotiations saying we want a total freeze over everything, because we'll never win that one and we all know that. Again, and this is where you may influence us, is that you may help us and the government develop a package that is reasonable and desirable to all of us. Because the North, as we all know, has a great deal to offer. The problem is that what it's had to offer has gone right over our heads, directly to the South. And, it can no longer continue that way. That's our major concern.

The last point I'd like to make relates to the question of self-government in the North. The aboriginal people in this part of the country, the Dene-Metis, are looking specifically at 2 approaches. One is the public government route that we have committed ourselves to for some time where we would participate and develop a pluralistic government that makes sense to all of us. We're still committed to that. In fact, I was in Ottawa recently, speaking with people in the Department of Indian Affairs and they've reassured us that we can get the funding now to go ahead and work on that. So, we're still committed to working with the rest of the residents of the Northwest Territories.

We're also committed to working on what we call self-government again. A different term, self-government on the lands that we own. We will own outright lands that to date total 70,000 square miles. On those lands, obviously, we'll have more control than on the lands that we don't own outright, so how do you work the different types of land? What's the regime going to be like on the lands that we own? It's a degree of self-government, because you're making some decisions for yourself. You're developing a direct relationship between yourself and the federal government, a direct relationship between yourself and the territorial government. All of those things have to be developed.

Again, to reassure you, we don't intend to persuade people not to come on to our lands, the lands that we own. If that was the case, we would never have signed treaties in 1899 and 1921. We intend to develop a regime that protects, obviously, our special interests as aboriginal people, but at the same time, we recognize that there's third party interest. And, again, on those lands, what will the rules be? What rules will apply? Whatever they are, we must all follow them, so that we have order. It's a lot of work but, it's 2 years down the road and we're slowly preparing ourselves. Recently, we spent a whole week in Lac Lemart, preparing as to how we ought to approach this. Soon, we meet in Inuvik with our leadership, and our chiefs, and our Metis presidents and there we will make some recommendations, and some clear-cut decisions as to how we're going to approach this whole question over the next 2 years. We are doing this while trying to work with government because we can't fight government all the time. I've done that all my life and it doesn't, in the end, really get me anywhere because three quarters of the time, I'm negative. I cannot be positive in the country that I was raised in and so, I have to turn that around and make that a positive development so that the North is a place where people want to live.

1.6

EVOLVING LAND CLAIMS: DISCUSSION

Report of Working Group
chaired by

Ewan Cotterill
Ewan Cotterill and Associates

Excerpts from Discussion

Ewan Cotterill: An interesting observation is that if you go back 15 years there was probably the closest thing to a single window approach from the regulations standpoint in the North that there's ever been, in the Mackenzie Valley pipeline application. But the reality is that it just didn't work because that single window didn't reflect all of the various interests that were at stake and, in a sense, what Roger Gruben was saying about northern corridors is that even if Brian Mulroney has found a single window inside a deal with the GNWT, if it didn't have the four major aboriginal groups on the side of it, then it really is an agreement that is of questionable value.

Roger Gruben: While the reality is the agreement is there, it's also a fact that it's lacking in support from people in the North at this particular time. However, the government can so very easily rectify this situation if they want to, by involving the groups and then come together in a more meaningful position.

William Erasmus: I think the point is that it's all iffy. From our point of view we have a problem in that we were supposed to be part of the team. We met and everyone was sitting across the table, we had all aboriginal groups there, Roger was taking the lead in some regards and I was trying to take the lead in others. We thought everything was clear, that obviously we were a very important party to the process and that we would have to work together.

A Discussant: I sense that it's a problem that some of you are laying off on the GNWT for creating. It seems to me that that's a body that you have elected. I mean they're your representatives and they should be negotiating a package that is representative of what the people want.

Jean Gravel: It might not necessarily be McKnight or the federal government that may be at fault or the rest of the country, because if the representative here did not see fit to consult with the groups, it would be as if the provincial government is not consulting the whole population but only the population in the largest communities. That doesn't mean that the federal government is wrong in signing an agreement with, let's say, the province of Alberta or the province of Quebec.

Roger Gruben: Bill Erasmus said that the problems with respect to the Northern Accord that we are facing today date back to the beginning of this year. Number one, partly because of process and partly because of the position that was being put together. In terms of process, the government committed themselves to equalizing the existence of the expertise of the

aboriginal associations, but they never did that. Number two, my understanding was that when it was time to get the GNWT to agree to the contents of the Accord package that it was the federal government who said "take it or leave it" if you want to get your foot in the door.

Now, the other part of the process which is a little difficult for us to accept is that we offered to help the government build up the comprehensive package to begin negotiations with and we offered to go to Ottawa, as a group, and see if we could get some consensus out of the federal government. However, the bureaucrats or the people who are working on behalf of the GNWT and putting a negotiating mandate together, told the aboriginal associations that one, we will involve you only on issues that affect you, and two, you are not going to be involved in any kind of discussions or negotiations relating to the fiscal regime.

The agreement does say financial rewards should be commensurate with interest. But, there is a subtle difference in wording between what was signed in Yellowknife and what was signed in Whitehorse in terms of those two agreements. To me it is commensurate with activity in the Beaufort. If the government really wants to be difficult the Yukon should be given a very minor position in getting anything out of the Beaufort Sea revenues and royalties. But, we say, yes indeed, we do have some connections with Whitehorse and the Yukon, so they should be entitled to some portion.

Ewan Cotterill: Relating all of this to aboriginal claims, I come back to the point, and this is a point that is frequently difficult for people in government to accept, that there are real limitations on the practical power of government regardless of its statutory and constitutional status. There are real limitations on its power if the major aboriginal groups in the northern territories aren't in agreement. So you've got to find some means of bringing them into the decision-making process. One of the objectives of aboriginal claims is to provide the mechanisms of institutions by which aboriginal people can come to their own decisions. If you don't have it, it won't work regardless of who the authority is on that matter. That's basically what is being said here; we have a government that has signed an Accord, but the four major groups aren't in agreement with what they've signed. And that, in my view, from the standpoint of practical experience in the North, throws the whole thing into question as far as its practicality.

A Discussant: Mr. Gruben has stated that in his view, the government in Ottawa said "take it or leave it". Perhaps the choice should have been to leave it. This is a very bad way of negotiating if somebody sits at the table and says "take it or leave it". The Government of the Northwest Territories has to realize that there are real issues at stake here. Just because Ottawa says "take it or leave it", doesn't mean that you have to take it. Between now and when the first barrels of oil will be produced in another 10 years, there will be two more governments to go through before you have to actually 'take' something. At a certain point in time you have to define what it is that is politically important. Say "take it or leave it" and just leave it. Just because they say "take it or leave it" doesn't mean that you have to sign. And that is kind of the attitude that both governments seem to take.

Roger Gruben: I would like you to go and ask maybe one or two questions of the group. Right now, we're, I guess, in this process trying to find one, mechanisms on how we can mutually benefit each other. We've given you a lot of thoughts, I guess, on how we expect to see certain types of activities handled on private lands, how we expect a vote on the Accord to shape up with the involvement of the aboriginal groups. What about industry? Do you have

some thoughts about the Northern Accord and do you want to see a Northern Accord? Secondly, do you want to see it based on the agreement as you know it, and thirdly, if you don't want to see it based on those agreements, what would you like to see in a Northern Accord?

A Discussant: Well, as you know, the Canadian Petroleum Association's (CPA) position has been that the Minister would like a Northern Accord from the point of view of getting some of the rules clear. That's the basic position in support of getting a Northern Accord, so that there's some agreement on the rules. Another assumption is that that agreement would be reached in consultation with all the interested parties which includes us, because, as the oil companies, we're part of the equation. Another point is that there is concern about increasingly complex environmental regulation.

Roger Gruben: What are the possibilities of the CPA and the people of the North putting together a document that could be negotiated with Ottawa? Is that ever a situation that could happen? Or, are our interests so far apart that we can't do that?

A Discussant: Not so far apart. A standard answer that a lot of companies have given on land claims has been, "You guys work it out; we don't want to get caught in the middle. You work it out and just let us know what the rules are and then we'll decide whether, under those rules, we want to invest or don't want to invest, but, don't get us in the middle".

Liz Fraikin: In my view it's always been very clear that it was assumed, maybe wrongly so, that the territorial governments would ensure that consultation with the aboriginal groups took place both before and after the process. With respect to the CPA companies, you could always lobby them to make points but I think lobbying may be far better within this government here than trying to get the industry to come in and either make your deal or your Accord.

Roger Gruben: That's probably the way the government announced it, that they wanted the negotiations to be government to government. But, at the same time, you know I think it's in the interest of industry to do some lobbying on their own.

William Erasmus: Ottawa has been telling us, and Minister McKnight has been telling us, "you're going to be consulted", but it doesn't mean we're happy. We've been consulted to death over the years. Are we a party at the table or not? If we are, then what are the rules? We could easily wait and we could have persuaded the NWT Government to wait and say, "there's an election, you might get something better from the next party", which is quite possible. But, you know, the question that I was trying to get to is - it's a game, right?, who's supposed to win? Is it at all possible that when you win, we win?

Ewan Cotterill: I think it's fair to declare, I've never heard so much dissension over something called an Accord.

Sandy Hershaw: Just a comment: there were a lot of opinions just through the fact that there are numerous companies with somewhat different competitive interests in the North and I'm not so sure that you get as ready consensus to pursue something in a very confrontational type of situation as you would within your own communities.

Ewan Cotterill: But, the CPA and the industry does have an interest. To the extent that there is not a Northern Accord and to the extent that there is not a consensus as to what the Northern Accord should be, it's going to cause problems for industry. I think that's very clear. I think it would be very unrealistic to expect industry, collectively or individually, to lobby for a particular version of an Accord, but CPA does have, I think, every right to say they're concerned with the fact that there still appears to be a great deal of dissatisfaction with what's happening. Therefore, the objectives of the Accord are not likely to be achieved.

I think there then becomes a second level of involvement with the industry yet, assuming you had a Northern Accord that was broadly accepted in the Northwest Territories by the aboriginal groups, by the territorial government and by the federal government. You will then have, obviously, a period of negotiations between the federal and territorial governments to work out what the regimes are going to be for management, so there really would be an area there for industry to come in and work with that group to come out with a regime that would meet the objectives without causing problems to the industry. That would be a non-confrontational type of situation. Maybe that's the note we should end the formal part of the discussion workshop.

1.7

THE ROLE OF TRADITIONAL KNOWLEDGE IN NORTHERN DEVELOPMENT

Report of Working Group
chaired by

Martha Johnson
Research Director
Dene Cultural Institute

The working group discussion began with the Research Director of the Dene Cultural Institute explaining the Institute's proposed research project to document the traditional knowledge the Dene have of the environment. The objectives of this study are:

(1) to document this vast reservoir of knowledge which is in danger of being lost

(2) to apply this knowledge to the development of a system of resource management for the North that recognizes the value of this knowledge and gives native people an equal role in its design and implementation

(3) to train Dene researchers to carry out future studies of this type on their own through the use of a community based approach to research

(4) to use this knowledge in the design of educational curriculum

The Research Director then gave a brief overview of the study of traditional knowledge to date. Some of the topics reviewed included:

- the similarities and differences between traditional and western scientific approaches to the interpretation of environmental phenomena

- the types of research that have been carried out in Canada about traditional knowledge

- the recognition on the part of local and international organizations of the value of traditional knowledge and the importance of involving local people in the design and implementation of resource management programmes

- the continued viability of traditional systems of resource management

- efforts to integrate traditional knowledge with western science

The following section gives a detailed summary of what was said about the above topics.

Biologists working in different parts of the world have often remarked on the ability of indigenous people to distinguish and to name the plants and animals in their environment. In many instances a close correspondence has been found to exist between the categories of

plants and animals named by natives and the scientific taxa. Further studies of classification systems have shown that all peoples recognize what they consider to be natural classes of animals and plants, and that people in all cultures are as much concerned to bring classificatory order to their world as are western scientists.

Over the past decade there has been a growing awareness, worldwide, of the value of the environmental knowledge aboriginal people possess. A growing body of literature attests not only to the presence of a vast reservoir of knowledge regarding animal behaviour, but also to the existence of effective indigenous systems of self-management which rely upon a sophisticated database to determine strategies for conserving natural resources.

In the N.W.T., research about traditional knowledge has been part of several land use and occupancy studies. The Inuit Land Use and Occupancy Project and the Mackenzie Valley Pipeline inquiry presented information documenting the land use of the Dene, Metis and Inuit peoples. Along with occupancy and land use data, these studies acknowledge the important cultural significance of the land for native people. In Quebec, research about traditional systems of resource management has been conducted by Drs. Feit and Berkes in response to the James Bay hydroelectric project in northern Quebec.

On an international level a number of organizations have developed interests in traditional environmental knowledge. In 1980, the IUCN (International Union for the Conservation of Nature and Natural Resources), the UNEF (The United Nations Environment Programme) and the WWF (World Wildlife Fund) joined together in the preparation of the World Conservation Strategy. This document brought to our attention the precarious state of the earth's natural resources as a result of an unlimited quest for economic development. It called for economic development that is ecologically sustainable. One way to achieve this sustainable development, it suggested, is to recognize traditional knowledge as an important source of ecological information. It was further acknowledged that paramount to achieving this goal, is the involvement of local people in all phases of the management process.

The recommendations of the World Conservation Strategy were later adopted by the 1984 Canadian Task Force on Northern Conservation which developed a framework for the creation of a comprehensive conservation policy for northern Canada.

What some of these studies of traditional knowledge have revealed is that although the observations of biologists and aboriginal hunters may be similar, their explanations of how the ecosystem works are based on two different world views. Western science separates the natural and the physical world from the human world. Phenomena are explained in terms of a set of laws which are continually tested over time through the accumulation of more quantified data. Aboriginal cultures, on the other hand, perceive of humans and nature as being inextricably linked. The system of beliefs and values of an indigenous society are the basis for explaining the natural and the physical world. Hunters' knowledge is generally based on qualitative observations because there is no need for them to absolutely quantify their observations. That does not mean, however, that hunters do not have a relative idea of the frequency of an observation.

All of these observations raise two related questions: (1) how can systems of knowledge based on different approaches be compared, and (2) how can this traditional knowledge be used to develop a system of wildlife management for the North that successfully integrates

both scientific and native perspectives? In an effort to answer these questions, several researchers working in the field have considered some of the advantages and disadvantages of both systems.

Gunn (1986) a wildlife biologist working among the Inuit of the western Arctic points out that scientists have an advantage in being able to draw upon the extensive ecological knowledge gathered in many parts of the world, and with the help of technology can observe wildlife over large areas or beneath the ice and water. Aboriginal hunters, on the other hand, have a reservoir of ecological knowledge that has accumulated over generations. Scientific work has a time depth of less than two hundred years.

It is commonly recognized that the northern ecosystem is characterized by annual variations in the abundance and distribution of wildlife - a single or two seasons' observations can be misleading. Hunters' observations can be a valuable guide to some of the longer term changes in wildlife distribution and behaviour. Similarly, the extensive travel of hunters during winter months leads to observations of behaviour not paralleled by biologists whose winter observations of arctic wildlife are often lacking.

The land, the water and the wildlife have sustained native Northerners for centuries in an environment most outsiders consider harsh and forbidding. This relationship between humans and the natural environment is absolutely central to native identity and culture. When explorers and scientists first ventured north, they quickly grew to appreciate this knowledge. Many would not have survived without assistance given to them by natives.

However, like any culture, aboriginal cultures are constantly changing. The question that arises is, what effects have the social and economic changes that have taken place in the North over the past century had on traditional environmental knowledge? Can traditional systems of resource management continue to exist in their present form?

Feit (1988) contends that even where traditional systems of resource management remain effective in their present forms, they are no longer capable of dealing with the many new types of problems local wildlife managers face today. For instance, wildlife-resource users are only rarely isolated from the impact of the international economic system or of state policy-making with respect to wildlife and development. National and international commercial interests, sport interests and non-renewable resource developments are all often beyond the direct influence of the practitioners of traditional self-management systems. Traditional forms of self-management, he claims, must respond to these threats to wildlife resources and to environments by extending self-management to new forms which regulate the actions of individuals and agencies outside the local or regional groups. According to Feit, examination of the histories of self-management will reveal some of the conditions under which self-management is maintained and under which it may break down. This information may in turn allow projections to be made about the types of conditions which may facilitate and enhance self-management in the future.

CONCLUSION

The North has been the subject of intensive study by scientists, primarily from the South for over 50 years. Virtually every aspect of the northern environment, its wildlife, its geography and its people have been closely studied at one time or another.

Throughout this period of time the researchers and the people in communities throughout the North have largely gone about their lives and work in relative isolation from each other. Although there are signs of improvement, as evidenced by the initiatives of the Dene Cultural Institute as well as the programmes established by the Northern Heritage Society (NWT) and the Makivik Research Project (Quebec), (the latter two represent attempts to encourage Northerners to learn about science, but at the same time to appreciate the contribution traditional knowledge can make to research), considerable work remains to be done if northern native peoples and the scientific community are to work together to apply new innovative approaches to old problems.

DISCUSSION

George Barnaby, a resident of Fort Good Hope, discussed some of the ways local knowledge obtained from the people of his community has been useful to scientists conducting research in the area on several occasions. This knowledge has been collected over generations of careful observation. George stressed the fact that local people, no matter who they are or where they live, observe the environment on a day to day basis, thus they are in a very good position to notice any changes that occur and to make recommendations regarding issues of environmental management.

The group then focussed their discussion on how to best make use of this local knowledge and the ways companies could become better informed about the concerns of the local people who they would be employing or who live in communities near where they would be working. The general consensus of the group was that cross-cultural workshops would be an effective way to inform company employees about the culture and the concerns of local people.

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CHAPTER 2

MANAGING DEVELOPMENT

2.1

NORTHERN OIL AND GAS MANAGEMENT POLICIES: AN INTRODUCTION

Andrew Macpherson
Director General
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Northwest Territories Region

The topic of northern oil and gas management policies is particularly significant in the context of the Northern Accord agreements-in-principle signed by the Prime Minister and the NWT Government Leader on September 6, 1988 and with the Yukon Government Leader on September 22, 1988. These are historic agreements for which my Minister, the Honourable Bill McKnight, has worked hard for the last two years. Though not yet firm transfers of responsibility, these agreements-in-principle have provided an entirely new basis for northern energy development. I intend therefore to outline the nature of these agreements, for the benefit of those who have not caught up with them yet.

The two deals together distinguish five administrative regions, as follows:

AREA	MANAGEMENT	REVENUES (LESS NATIVE CLAIMS REVENUES)
NWT ONSHORE	NWTG	NWTG
YT ONSHORE	YTG	YTG
BEAUFORT SEA	NWTG/YTG/CANADA	NWTG/YTG
North of 60 (residue)	NWTG/CANADA	NWTG
HUDSON BAY and STRAIT	NOT ADDRESSED	NOT ADDRESSED

For the first two, management and revenue (less any proportion negotiated by claimant groups) transfer to the respective territorial government. For the Beaufort Sea, which lies offshore both Yukon and NWT, revenues will go to the territorial governments, but they will share the administration with Canada, including costs. For North of 60, with the exception of the Beaufort and Hudson Bay and Strait, revenues will go to the NWT Government and management will be shared, with costs, between that government and Canada. Finally, for Hudson Bay and Strait, the Accords are silent on any successor arrangement to the present Canada Oil and Gas Lands Administration (COGLA).

The AIPs call for phased transfers, from DIAND to the territorial governments (T.G.s), of the management responsibilities, the revenues and the resources (dollars and people) to run the programs. They specify that the onshore management regime will initially be based on existing laws in force, and that the eventual regimes will be not unlike others in Canada. The offshore management, as stated, will be shared with Canada. The revenues from oil and gas will be redirected to territorial government coffers, with existing federal funding reduced, by a lesser amount to ensure there is an incentive. In the event of very large revenue, an increment of that will revert to Canada. The AIPs also address the protection of aboriginal interests, asking the territorial governments to develop appropriate arrangements. Those are the basic features of these AIPs.

Energy resources are significant to any region, and particularly to cold ones. Hydrocarbons still support well over half our national energy consumption. They also contribute to our trade balance, as we are net exporters. Additionally, they generate a great deal of economic activity, from exploration, production, transportation, retailing and so on, and they contribute significantly to government revenues.

Oil and gas management policies are complex and historically contentious. They must work at all stages of the cycles of price and supply. They must provide for an equitable distribution of costs and benefits.

Frontier energy exploration in the 1970s was fuelled by incentive schemes, as the need at the time was to find out how self-sufficient we were or could become. At the Canadian Petroleum Association Fairmont Conference last May (1988), the call was for frontier development, a call that has since been answered by a number of megaproject announcements. Managing the balance between becoming a pawn of the market-place and becoming highly interventionist is clearly a very significant responsibility of the federal and provincial governments.

2.2 THE CONTRIBUTION OF LAND USE PLANNING TO OIL AND GAS DEVELOPMENT IN THE NORTHWEST TERRITORIES

Ian D. Robertson
Regional Land Use Planning Division
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Government of the Northwest Territories

Can regional land use planning help the oil and gas industry? I am here to convince you it can and will, but there is one condition. Regional land use planning will not be effective unless you in the industry participate directly. I am here to tell you the opportunity is there to get involved. It makes good business sense. Regional planning is simply thinking ahead. It is an investment in the future. The dividends for industry are measurable but there is no free lunch. Participation will cost you time and money but the net benefits include: greater certainty over the ground rules for development, a simpler, clearer and less expensive approval process and less political tension. Regional land use planning can contribute to a "level playing field".

To understand the contribution that regional land use planning can make, it is important to distinguish between the planning process and the product or plan. Regional land use planning is an open, public process. It is a forum for negotiating and seeking consensus. A regional land use plan is really a road map. If you know where you are going, the plan shows various ways to get there. Like a good road map, it gives you information about the conditions you might encounter along the way. It is still your responsibility to select the route weighing the advantages and disadvantages of each choice. A regional land use plan is just a tool to help you plan your project and help the politician evaluate it.

Regional planning in the Northwest Territories is similar but not quite the same as in the provinces. We are breaking new ground by focussing on community concerns first. This "bottom-up" approach emphasizes public participation and the use of local knowledge. Second, we are dealing with large areas with few settlements but where those few settlements are dependent on large areas to protect their renewable resource base. Third, our ability to predict or influence change is limited. Heather Myers, our planner in Pond Inlet, points out:

> "Change is often an uncomfortable prospect; unknown, unspecified, uncontrolled change is a frightening one. If you cannot predict what might happen in the future, it is impossible to make a plan for future activities. You can, however, make a plan for the values you know about. These are the values that the communities have sought to protect."

Because of the rapid pace of change, regional land use planning is inevitably bound up in the current issues of land claims, local control and the preservation of renewable resource harvesting opportunities.

To date, we have found that the basic building block for regional planning in the North must be an acceptance of the principle of conservation. Conservation does not preclude the development or use of resources. Some northern residents may appear to be anti-development. I would argue they are really just cautious. They want development of market oriented non-renewable resources to proceed at a scale and pace that is appropriate to their needs without jeopardizing the cultural and economic stability of their renewable resource base. Both retention of the quality of resources and sustainability of their use must be inherent in any plans for their use or development.

Regional land use planning must be a cooperative partnership between government, industry and the native organizations. The 1983 Land Use Planning Basis of Agreement has five key principles. They are:

- plans must reflect regional residents' values and priorities
- plans must provide for conservation and development of all land and water resources including the offshore
- planning should be done in the North by Northerners
- public participation is essential
- native people have special interests and roles to play

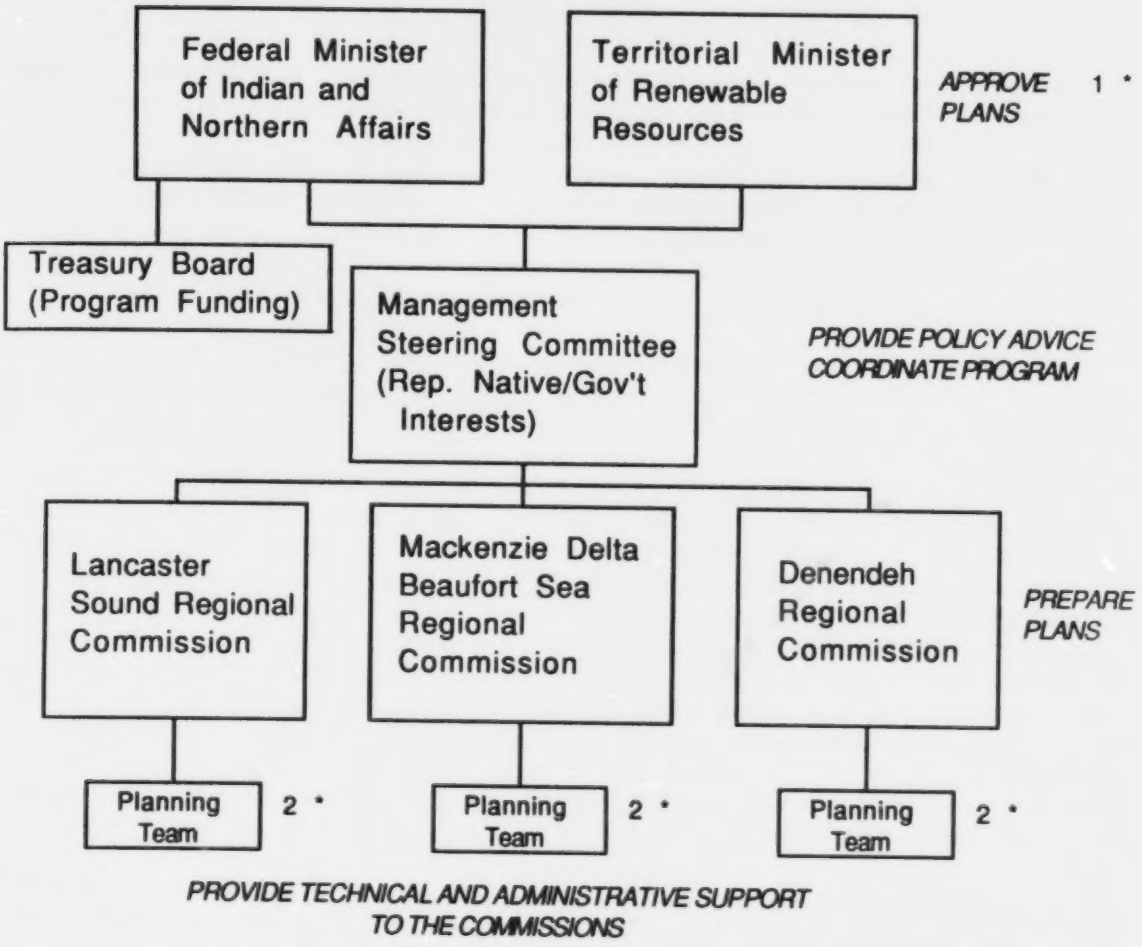
These same principles are embodied in the land use planning provisions of the various land claim agreements. Figure 1 illustrates how the regional planning program is currently structured.

Those of you that have been involved in the program in the past, will notice that there have been changes. The Policy Advisory Committee and Northwest Territories-wide Land Use Commission have been eliminated, replaced by a six person steering committee. These changes streamline administration and increase regional commission autonomy. The Management Steering Committee advises the federal Minister of Indian Affairs and Northern Development and territorial Minister of Renewable Resources on planning priorities and resource needs. They also draft the directives which form the terms of reference for new commissions. The Ministers have overall responsibility for the program. They will approve the final regional plan submitted by the Commissions.

The Regional Commissions are responsible for plan preparation. They direct technical staff supplied by the Northern Land Use Planning Office and the planning partners. Once the plan is finished, the Regional Commissions will monitor implementation.

Briefly, here is where we are at. In Lancaster Sound, the Regional Commission has released a second draft of the proposed plan. There has been extensive public consultation. Government and industry will have an opportunity to present their views at public hearings in Iqaluit (October 12-13, 1988). The Regional Commission will then tour the affected communities to get their reaction. The draft will be revised in November and submitted to the Ministers in December for approval. It is critical that the oil and gas industry make their views known at Iqaluit.

NORTHWEST TERRITORIES
NORTHERN LAND USE PLANNING PROGRAM



1 * Regional Commissions are independent of government or native organizations. They submit plans directly to the Ministers.

2 * Provided by Northern Land Use Planning Office, GNWT Regional Land Use Planning Division or the native organizations.

Figure 1

There have been changes to the Beaufort Sea/Mackenzie Delta Regional Commission. The planning region has been adjusted to reflect the land claim boundary between the Inuvialuit and Dene-Metis. There will be one planning commission for all lands in the Inuvialuit Settlement area. The Beaufort/Mackenzie Commission has just released an interim report. This summarizes its activities and suggests the direction the plan will take in addressing regional issues. It is anticipated that the draft plan will now be complete by December 1989, not June as first anticipated. Industry comment on the interim report is welcomed.

A third regional planning commission is now planned for the entire Dene-Metis settlement area. The Denendeh Regional Commission should be appointed this fall. In keeping with the Dene-Metis land claim agreement-in-principle, the Commission will have 50% Dene-Metis representation. Because there are five sub-regions, the Commission will have 10 members to ensure all areas are represented. The Dene-Metis in the Mackenzie Delta communities have decided they would prefer to participate on the Denendeh Commission. When it is set-up, they will switch from the Beaufort/Mackenzie Commission to the new Commission. This will resolve some land claim boundary issues. Industry has been approached for nominations.

In 1989 with completion of the Lancaster Sound Plan, another portion of Nunavut can be addressed. Recommendations on which area should be planned next and how, will be discussed by the Management Steering Committee this fall.

There are a number of oil and gas issues which have regional land use planning implications. The obvious one of course is the Mackenzie Valley pipeline and especially that portion north of Norman Wells. The location/timing of improvements to transportation infrastructure is a key concern. Should there be one integrated port facility on the Beaufort Sea or several? Where should industrial wastes be disposed of? How do we maximize northern benefits and minimize negative impacts such as the boom/bust syndrome? All these issues have a physical presence on the land that we can see. These impacts are measurable as the monitoring program for the Norman Wells pipeline shows. We must also recognize that the regional plan will affect the oil and gas industry. The impacts can be positive or negative. For example, if a proponent can show that their proposal is consistent with the plan's goals, and addresses community concerns, regulatory review may be simplified. The plan can also help the proponent identify issues and minimize the risk of surprises which could delay a project.

What is less tangible, but essential to planning and development, is a practical, simple policy framework. The National Energy Program is an example of a policy which had a major impact on planning for both government and industry. The recent agreement between Canada and the Northwest Territories to develop a Northern Accord has long term implications for development. I would also draw your attention to our government's strategic planning initiative called "Directions 1990" which emphasizes participation, planning ahead, and self-reliance. The themes of conservation, sustainable development and participation represent the basic building blocks for regional planning. Because there is no legislative basis for regional planning at this time, implementation is heavily dependent on consensus and policy commitment.

Both the Minister of Indian Affairs and Northern Development and Minister of Renewable Resources are prepared to seek cabinet approval of the regional land use plans. Since the principal native organizations have equal representation on the regional commissions and the communities have been active participants, they are likely to support the final plan. Thus the

key to successful implementation at this time rests on the consensus achieved through a cooperative partnership in plan preparation. The oil and gas industry has had an influence on policy and regional plan development. It is no coincidence that the first two priority planning regions have significant oil and gas potential.

In closing, I would like to stress again, the opportunity to participate in regional land use planning is there. It is an open, public process built around community involvement, conservation and sustainable use. We recognize the importance of involving industry. You will get a fair hearing. It will cost time and money now but the dividends are worth the investment. Much of the information collected for planning purposes is useful to a developer in preparing for regulatory review. Simply by talking in an open, frank manner about your industry's ideas and plans can alleviate a great deal of initial suspicion. Participate in preparing the regional plan and you can build respect and trust. Can we count on your support?

2.3 HISTORY AND CURRENT ACTIVITIES OF BP IN ALASKA

Alan Leske
Joint Venture Manager
BP America

I would like to talk about BP's history in hydrocarbon exploration and development in Alaska. The Alaskan North Slope where the main oil activity is, is about 600 miles north of Anchorage.

BP IN ALASKA: HISTORY

BP started its activities in Alaska in the mid to late fifties with some drilling which was considerably south of the main Prudhoe area and then worked north. ARCO and Exxon drilled a discovery well in Prudhoe Bay in 1968 and that was followed by a BP confirmation well in early 1969. Soon after, engineering for the pipeline was initiated but came to a halt in 1971 due to environmental and native land claims issues. It was held up in congress until 1973 when Alaska pipeline construction was approved. In 1977, production from Prudhoe Bay started and built up to 1.5 million barrels a day by 1979. In 1981 the Kuparuk field started production. In 1984, Chevron and BP negotiated exploration rights to drill on exploratory lands held by native corporations. In 1985, a small field, Niacook, was discovered and in 1986 the Prudhoe Bay Lisburne field started up. In 1987 Prudhoe Bay field reached cumulative production of 5 million barrels and by the end of 1988 will total 6 million barrels. Also in 1987, Beaufort's first offshore field, Endicott, began production and Congress began the Arctic National Wildlife Refuge (A.N.W.R.) debate. In 1988, Alaska became the largest oil producing state. The Prudhoe Bay field was the impetus for all this development and for the pipeline. It is roughly 250 square miles and is divided into 2 operating areas, the eastern area is under Atlantic Richfield's control (ARCO) and the western area is operated by BP. There are 6 major production facilities, as well as a seawater intake plant and a gas processing facility. The field originally had 22 billion barrels of oil in place and we estimate that we can recover about 11 billion barrels of total liquids (oil, gas, condensate and NGLs). The current field rate is about 1.6 million barrels a day and we produce about 1 billion feet a day of gas, most of which is reinjected. We have drilled 850 wells and we expect ultimately to drill 1300 wells. Capital expenditures for the field, not including the pipeline, ultimately will be approximately $17 billion.

Kuparuk

This field is located west of Prudhoe Bay by about 25 miles and is operated by ARCO. It had, originally, 6.4 billion barrels in place. Its current production rate is about 300 thousand barrels a day and it has about 550 wells and ultimately expects to have about 1200. Infield drilling and peripheral drilling are the main activities at the present time.

Endicott

This is the newest of the fields and is located offshore. It is connected to land by a gravel causeway and there are two islands, one is the main production island where they have the production facilities and wells and a satellite drilling island which only has wells. This field is located in about 15-20 feet of water and has about 1 billion barrels of oil in place. We

estimate that we can recover about 350 million barrels. Current production rate is just a little over 100 thousand barrels a day. We have 40 wells and ultimately expect to reach 100 wells. Cumulative cost for this field ultimately will total $1.1 billion.

Lisburne Field

This underlies the Prudhoe Bay field -- it's in a deeper reservoir. It's a carbonate reservoir, in contrast to the sandstone of Prudhoe Bay and is much more complex. An estimated 3 billion barrels of oil are in place. We estimate that we can recover somewhere in the neighbourhood of 330 million barrels. Current production rate is about 50 thousand barrels a day with 50 wells. We estimate that ultimately we will spend $1.5 billion dollars on it.

Niacook

This was discovered by Standard. I use the terms Standard and BP interchangeably. This field was discovered in 1985. It's north of Prudhoe Bay and slightly offshore. We estimate that it has 380 million barrels of oil in place and that we can recover about 60 million barrels. The cost to develop this field will be $130 million. We are currently in the permitting process.

Those are all the active fields that BP has an interest in -- operating or working interest. There is one other field which I will briefly mention, the Milnay Point field. It started production in 1985 and was shut down towards the early part of '86 when oil prices deteriorated so significantly. It was producing in the neighbourhood of 15,000 barrels a day. The major owner is Conoco.

Of course, all these fields on the North Slope wouldn't be possible without a pipeline system and I'm sure that most of you are aware of the Trans Alaska Pipeline System (T.A.P.S.). It runs from the North Slope to Valdez, about 800 miles in length. It's connected to the Kuparuk field, as well as the Endicott, Prudhoe and Lisburne fields.

The 48" diameter pipeline has cumulative throughput to date of about 6.5 billion barrels. Its capacity with the addition of drag reducing additive is 2.1 million barrels a day and that is its current production rate. The cumulative gross costs (capital cost) for the pipeline were about 10-11 billion dollars.

I mentioned previously the Arctic National Wildlife Refuge. This in its present form was created by provisions of the Alaska National Interest Lands Conservation Act of 1980. At that time, Congress set aside 19 million acres for the Refuge, of which 8 million was designated as wilderness. The 1.5 million acre coastal plain was set aside for 5 years to study and determine the relative merits of potentially large oil and gas reserves and its wildlife values. By the terms of the 1980 legislation, and the Alaska Native Lands Settlement, the Arctic Slope Regional Corporation obtained 9.2 million acres of sub-surface rights. Chevron and BP America negotiated exclusive exploration rights on this acreage and drilled the first well there in 1984. By 1987, the Department of the Interior had concluded its preliminary environmental impact statement and stated that the mean estimate of recovery in A.N.W.R. was 3.2 billion barrels and also stated that development of these resources would be compatible with existing wildlife. The issue, as most of you know, is now with Congress. Action during this year is unlikely. After the presidential election we should see some activity next year.

Of course, one of the main reasons we're looking at A.N.W.R. for the future is the projected increased reliance on imports and we hope to offset that with domestic production to the largest extent possible.

The important point is that there is significant potential in the North whichever side of the border it's on. BP has an interest in about 33 billion barrels of oil in place and estimates to recover about 13.5 billion barrels. Expenditures have been large. Total capital expenditure for all the fields which I've mentioned and the pipeline total about $38 billion. This has been a very challenging 20-30 years. I think nobody would have guessed the outcome back in the 50s. But, we've been successful and been able to meet the challenges and I think one of the things that's been useful in the work that we do every day, is trying to look at all the alternatives in doing our business; controlling costs, obviously, is one important aspect. In any event, I think with the collective intelligence and the technology which has been developed to date, the Canadian and the Alaskan North represent significant potential for the future.

2.4 A NORTHERN VIEW OF OIL AND GAS DEVELOPMENTS

Roger Gruben
Chief Regional Councillor
Inuvialuit Regional Corporation

NORTHERN CONCERNS

Until the beginning of the 1980s Northerners had little to do with northern hydrocarbon development. There were no northern oil companies. There were no major northern oil industry related service companies. The territorial status of the Northwest Territories meant that Northerners would not receive royalties or other resource revenues from hydrocarbon production and were unable to make their own laws and regulations related to petroleum. Northern direct employment creation or business opportunities related to hydrocarbon exploration were very modest and were not more than a few million dollars per year. Both the Northerners and the Government of Canada felt that this was an undesirable situation. The parties have, therefore, tried to address the problem primarily in two ways:

- through the land claims process, and
- through the Northern Accord.

I would like to comment on the progress that has been made in each of these two areas.

THE INUVIALUIT LAND CLAIM

The Inuvialuit Final Agreement

The Inuvialuit land claims were finally settled when the Western Arctic (Inuvialuit) Claims Settlement Act was given effect on the 25th of July 1984. The Inuvialuit are the native people who inhabit the western Arctic region. They are living in the following six communities: Inuvik, Aklavik, Tuktoyaktuk, Sachs Harbour, Paulatuk and Holman Island.

In the Final Agreement the Inuvialuit retained 35,000 square miles of lands. Of this total, 5000 square miles include surface and subsurface ownership while the remaining 30,000 square miles relate only to surface ownership. The Inuvialuit received cash payments totalling $152 million on the basis of a schedule of payments that will terminate by 1997. Additionally, the Inuvialuit received extensive hunting, trapping, and other rights in the Agreement.

The Inuvialuit Oil and Gas Resources

With respect to the Inuvialuit oil and gas resources in our subsurface lands, the blocks of the communities of Tuktoyaktuk and Inuvik are the most valuable. In the Tuktoyaktuk lands the first discovery of oil was made at Mayogiak. Subsequently, important gas and oil reserves were discovered in the West Tuk structure. In the Inuvik block, important gas discoveries were made in the Reindeer and Ikhil locations. In total, we estimate that the discovered oil and gas reserves in Inuvialuit lands are close to 100 million barrels of oil and 400 billion cubic feet of gas.

The Inuvialuit carry out their own oil and gas administration through the Inuvialuit Land Administration. A concession was concluded with Esso and its partners on the Tuktoyaktuk lands. This concession provides for the following main conditions:

- a 30 year initial term
- a relinquishment obligation of 70% of the area after the first 8 year period
- the requirement to drill two exploration wells to 2500 meters
- a basic royalty in accordance with a sliding scale over time going up to 10% for oil and 8% for gas
- in addition to the basic royalty a profit sharing royalty equal to 34% of all after tax profits after a book return of 20%, and
- a carried interest of 25% after a commercial discovery

The exploration and development activities under the concession have progressed well and the Inuvialuit are satisfied with this first effort of the native people in Canada to administer their own petroleum resources.

Participation Agreements

Another important aspect of the Inuvialuit Land Administration is the management of the surface access. In the case of oil companies wanting access to the subsurface resources that belong to the Crown, or in the case of pipeline companies wanting access for a pipeline right-of-way, Participation Agreements must be concluded with the Inuvialuit. The Participation Agreements deal with land rents, compensation for damage, recovery of administration costs, wildlife compensation, employment, service and supply contracts, education and training, and equity participation.

The Inuvialuit Land Administration has set up orderly procedures to deal with the negotiation and approval of these Participation Agreements, and this system has successfully passed its first test. Probably the largest onshore drilling program ever on Tuk Peninsula was executed on Inuvialuit lands between 1984 and 1986 without any problems. The Participation Agreements have proved to be of tremendous benefit to the Inuvialuit and are an important part in the overall strategy of involving the Inuvialuit more in the oil and gas industry.

The Inuvialuit Petroleum Corporation

The Inuvialuit wish to see a more direct involvement in the oil industry. To achieve this involvement we created in 1985, the IPC, the Inuvialuit Petroleum Corporation. The IPC started to work in Alberta. It is believed that it is better to start a small oil company in Alberta than in the North. The North was considered too risky. In this way we can learn about the oil industry and as well train our people. Once oil and gas activities return to the western Arctic, the IPC will be capable of handling small investments and be a partner in some of these oil and gas ventures.

The IPC owns the 25% carried interest in the Esso Concession. The IPC has acquired the control of a small Alberta oil company named Knee Hill Energy. Through Knee Hill, the IPC has the operatorship of many properties. In this way the IPC has drilled during 1988 almost one well per week. The total reserves that are owned or controlled by the IPC in western Canada are about 1.2 million barrels of oil and 14.2 billion cubic feet of gas. The IPC and its

subsidiary are currently producing about 800 barrels of oil and 1.6 million cubic feet of gas per day. Three Inuvialuit are being trained for accounting and land management positions in the IPC.

Oil and Gas Service Companies

The Inuvialuit have also invested in many companies that deliver services to the oil industry. Firstly, the Inuvialuit acquired jointly with Nunasi, the largest marine transportation company in the Northwest Territories, the Northern Transportation Company Limited, or NTCL. We also own a 50% interest in Aklak. Aklak developed in the last few years into the main carrier of the western Arctic region. We created a drilling company, Atco-Equtak, which has provided drilling services to Shell and Petro-Canada.

Under the new system of Participation Agreements some of our private Inuvialuit companies also flourished. Gruben's Transport must be counted as one of the most successful ones. They are now, jointly with ATL, involved in the exciting new technology of building ice islands. This season such an ice island will be built for the first time in the Beaufort area in order to drill an offshore exploration well.

Conclusion

It can be concluded that during the first four years the implementation of the Inuvialuit Final Agreement has been highly successful. During these four years the Inuvialuit established their own land administration, negotiated their own oil and gas concession, created their own petroleum company and established a wide variety of service companies in order to be able to benefit from oil and gas activities in the Beaufort-Mackenzie area. As a result, the Inuvialuit are now well positioned to play an active role in northern hydrocarbon development.

THE NORTHERN ACCORD

Unfortunately, with respect to the Northern Accord, the views of the Inuvialuit are not as positive. We believe that the outline that was recently signed in Yellowknife for negotiating a Northern Accord is not a good basis for such negotiations. I would like to discuss and explain, one by one, our main concerns.

Resource Revenues and Net Fiscal Benefit

The Outline for Negotiations provides for the fact that the oil and gas resource revenues from the onshore and offshore areas will be for the use and benefit of the Northwest Territories. The agreement states also that the federal assistance under the Formula Financing Agreement will be reduced as oil and gas resource revenues are being received. However, the reduction will be carried out in such a way that there remains a financial incentive from increased production. The Outline also states that the existing onshore and offshore legislation will be the Canada Petroleum Resources Act (CPRA).

The main problem that we see with this combination of provisions in the Outline is that it practically assures that there will be no meaningful net fiscal benefit from oil and gas production to the Northwest Territories. To begin with, the draft regulations under the CPRA

provide for a very low royalty regime. The royalties are being calculated on the basis of the wellhead value which is determined on the basis of the market value in southern Canada less all transport fees and gas processing fees. This means that if the gas price in southern Canada was $4 per thousand cubic feet, the wellhead price may only be $0.40 per thousand cubic feet, due to the high initial transport costs and gas processing costs that have to be deducted. An oil price of $30 per barrel may only result in a wellhead price of $20.

Based on this low wellhead value, the royalties start at 1% and increase to 5% over a six year period. The royalties could be converted to a 30% profit share after payout. However, payout is defined in such a manner that the cost base includes a healthy rate of return of 10% over the bond rate which could be more than 20% in total. This means payout will not be reached or only very late in the life of an oil or gas field. For all practical purposes, therefore, the royalties will be 5% as a maximum. However, additionally, the draft regulations include a royalty credit of up to $5 million per well that can be directly offset from the royalty obligations.

Putting all these factors together it is very possible that there might be no royalties at all during certain years, while in most of the years the royalties may be very low. In case there are some very low royalties, the Government of the Northwest Territories has agreed to share these low royalties even further through a reduction of the Formula Financing Agreement.

It is our position that the net fiscal benefit to the North should be at least 10% of the value of the resources at the US/Canada border. The final Northern Accord should contain specific provisions in this regard. In other words, if the oil price is $30 per barrel, the net fiscal benefit to the North should be as a minimum $3 per barrel.

Another severe shortcoming of the Outline is that it makes no mention of the fact that the corporate income tax and sales tax on oil and gas activities in the offshore areas should belong to the Northwest Territories as is the case in Newfoundland.

Northern Style Petroleum Legislation

The Outline indicates that the North would receive, in a phased manner, the legislative powers for onshore areas. However, one of the most objectionable provisions in the Outline relates to the fact that the eventual legislative regime has to be modelled after existing regimes in Canada and has to be compatible with the offshore regime. This clause in the agreement typifies the arrogant and paternalistic nature of the Government of Canada.

The North is allowed to manage its petroleum resources; but, the Government of Canada will continue to prevent Northerners from making their own decisions. Firstly, there is no sensible reason for this clause. The onshore economically recoverable oil and gas resources constitute only a small fraction of the total Canadian petroleum resource base. These resources are not crucial to the survival of Canada, justifying extraordinary provisions in a Northern Accord. However, secondly, there are many good reasons why a northern petroleum legislation might very well have to be quite different from southern style legislation.

For instance, the typical southern style petroleum legislation provides for rather detailed procedures and provisions that equally and universally apply to the entire province. In other words, royalty regimes, for instance, would be identical across a province. In the North, this is not the best approach. In the North it would be much better to provide for only a general

framework legislation and then subsequently negotiate the terms and conditions of each licence on a case by case basis, by the time the international oil price has returned to levels that make northern activities attractive again. If the logistics are relatively easy and the geological potential is high, one could negotiate favourable terms for the North. On the other hand, if costs are high and the geological potential is relatively unattractive but local communities still wish to see some exploration carried out, one could try to attract the oil industry to such an area with generous terms.

In this way, the best possible terms and conditions can be negotiated individually for each licence on the basis of:

- expected geology,
- costs and logistics, and
- above all, the different desires, objectives and concerns of the surrounding communities.

Of course, this is not the southern Canadian way of doing things. However, this system might be much better for the North. Interestingly, the method that we would like to use in the North is typical for most developing countries in the world. Egypt, Malaysia, China, and many other countries negotiate petroleum deals on a case by case basis and have increased their petroleum production at a much faster rate than Canada. Many Asian countries have proven to be far more successful than Canada in terms of economic growth during the last two decades.

We often believe in the North that we can learn more from some of the developing countries, above all the Asian countries, with respect to economic and resource development strategies than from the Canadian provinces, particularly, because much of our problems are similar to theirs. However, the Outline forbids us to learn from other countries and we have to legislate with respect to our petroleum resources the southern Canadian way.

It is the Inuvialuit position that the Northerners should be allowed to design their own economic and resource development strategies for onshore oil and gas resources and that they should be allowed to make northern style petroleum legislation without restrictions imposed by the Government of Canada.

Northern Benefits

The matter of economic spin-offs is an important issue in northern hydrocarbon developments. The Outline provides for the fact that the Government of the Northwest Territories will manage the territorial benefit programs. This is a very meager result. In the case of Newfoundland, the Atlantic Accord provided for a $300 million regional development program. The reason for the Newfoundland program was to improve the ability of the province to absorb the benefits associated with the possible oil and gas developments.

We believe that the same argument applies in the North. Local spin-offs are really very limited. We estimate that in the western Arctic the local direct economic spin-offs are approximately 3% of the total onshore and offshore expenditures. This is very minimal. These low spin-offs are largely the result of the fact that the local industries are not sophisticated enough or strong enough to provide high quality services to the oil industry at a competitive price.

In order for the North to benefit more from the oil activities, the local industries have to be strengthened. We believe that a regional development program to prepare local industries for the oil and gas developments is urgently required. It will take five to ten years to build the local experience and expertise and if we would like to benefit from the developments in the late 1990s, we have to start the process of strengthening our service companies now. It is a serious omission that the Outline does not include the provision for such a regional development plan.

A serious drawback of the current northern benefits programs managed by Ottawa is that the programs have been unsuccessful. Typically, some vague clauses were included in exploration agreements regarding the need for northern benefits and job opportunities. These clauses were never enforced and we have been unable to identify a single job or business contract in the western Arctic that was obtained as a result of the enforcement of these clauses by the Canada Oil and Gas Lands Administration (COGLA). All the northern benefits were obtained because the petroleum industry on its own initiative wanted to involve the Northerners. The Inuvialuit Land Administration has proven that the organization of northern benefits at the community level on the basis of concrete bargaining powers is a far more successful form of organization. We urge the Government of the Northwest Territories to commit early to a clear policy of making the northern benefits programs community based.

Impact on the Land Claims

One of the main impacts of the Inuvialuit Land Claims settlement was a considerable shift of power from the bureaucracy to the native people in terms of administration and decision-making. This results in many problems. Many government officials do not seem to be aware of our Final Agreement or seem to be unwilling to work in accordance with its provisions. Some bureaucrats are even trying to undermine our land claim. We experienced, for instance, the so-called land use planning process. Millions of dollars were spent in the western Arctic region without any purpose.

The government land use planners seem determined to make the orderly administration of Inuvialuit lands impossible by eventually overlapping the Inuvialuit administration with suffocating land use planning procedures. We do not need government planners to tell us how to zone our own private lands. In another development, for instance, COGLA recently issued, without our concurrence, Significant Discovery Licences on our Inuvik block, undermining the provisions of the Final Agreement which, in Subsection 7(94), clearly prohibits the making of government decisions that prejudice the economic interests of the Inuvialuit.

From the various discussions that we have had with the negotiating team of the Government of the Northwest Territories we have the strong impression that they are contemplating serious negative impacts on our land claims. Some members of the team for instance, expressed their opposition to our ability to charge pipeline rentals, which we are clearly allowed under the Final Agreement. Other members were of the opinion that our ability to negotiate freely, Participation Agreements under Section 10 of our Final Agreement, should be undermined by territorial bureaucrats who would provide us with guidelines.

In this framework we strongly object to the provision in the Outline that permits the Government of the Northwest Territories to develop so-called effective means of protecting aboriginal interests related to oil and gas resource management. We did not ask for this protection. Our

land claim is clearly protected under the Western Arctic (Inuvialuit) Claims Settlement Act which, in turn, is protected under the constitution. We do not need the protection of the bureaucrats of the Northwest Territories. We know that the moment bureaucrats come to try to protect us that the automatic result is heavy interference in our affairs.

Conclusion

The above explanation will hopefully illustrate why the Inuvialuit are against the Outline in its present form. However, apart from the Inuvialuit, the other native groups in the Northwest Territories have similar concerns. These other native groups are the Dene Nation, the Metis Association, and the Tungavik Federation of Nunavut.

In order to underline our joint determination to improve the possible Northern Accord, we have issued a joint press release which defines our position. In our opinion a Northern Accord should include as a minimum:

1. Northerners should receive 10% of the value of the onshore and offshore resource revenues based on a value measured at the Canada/US border.

2. Northerners should have the right to make their own petroleum legislation without restriction.

3. The Government of the Northwest Territories should not impact negatively on the land claims.

4. Northern benefits programs should be community based and should provide economic stability, growth and diversification.

SUMMARY

I hope that this overview has given you an impression of the views of the Inuvialuit about the northern hydrocarbon developments. We believe that the first four years of operation of our land claims have been a clear success in providing more involvement for our people in the oil and gas industry. At the same time, we believe that the Outline on the Northern Accord is totally unsatisfactory and we believe that considerable improvements are necessary before a Northern Accord would be acceptable to most Northerners.

During the last four years the Inuvialuit have built up valuable experience in managing oil and gas rights, surface access, and their own oil company and service companies and as a result we look forward to an important involvement in the northern hydrocarbon developments. At the same time we are willing to use this experience to participate in a cooperative way in the negotiations towards a better Northern Accord.

2.5 NORTHERN HYDROCARBON DEVELOPMENT: PERSPECTIVE

Hans Maciej
Vice-President
Canadian Petroleum Association

When I last spoke on a similar subject in May at the 1988 Fairmont Workshop, I started my presentation with a quote from the March 4, 1985 edition of the New Yorker. It went like this: "Oil kindles extraordinary emotions and hopes, since oil is above all, a great temptation. It is the temptation of ease, wealth, strength, fortune, power. It is a filthy, foul-smelling liquid that squirts obligingly up into the air and falls back to earth as a rustling shower of money... The concept of oil expresses perfectly the eternal human dream of wealth achieved through lucky accident, through a kiss of fortune, and not through sweat and hard work. In this sense, oil is a fairy tale and, like every fairy tale, a bit of a lie."

As an outside bystander and observer of the land claims settlement negotiations and the Northern Accord deliberations, I often had the feeling that an underlying hope of wealth through oil has not been absent from the process; perhaps in some participants' minds it weighed rather heavily. And while psychologists advise never to disrupt a dream (and I know you are awake out there), I feel obliged to bring the reality of the marketplace into the perspective of northern development.

The reality that northern development faces is the world oil market of 1988. That reality is convulsive with little indication of abatement in the next few years. Although other elements enter the field of vision as well, the level and behaviour of the world oil price is and will be, the most important single factor to keep in sight.

Let's talk a bit about the world oil market. There are no words adequate to describe the abrupt changes in the past 15 years. They have confounded even the most skillful and experienced people in the business. Yet the industry has survived, with a lot of scars mind you, and it must continue to contemplate and plan the future.

Pity the poor forecaster. He has been abused and ridiculed over the past errors of energy forecasting, yet he remains indispensable to the business planning process in a highly capitalized industry such as ours. He must continue to give management his best advice possible about the way in which the economy and world oil market is likely to shape in the years immediately ahead.

There has been a great deal of soul searching about what went wrong with past forecasts. Most experts will agree that it comes down to assumptions and how good and valid they are. But how does one forecast a Yom Kippur war with the Arab embargo that precipitated the first price hike? Or what about the 1979 Iranian revolution which was even more disastrous in its immediate implications and which sowed the seeds for the 1986 price collapse? Or, taking you a bit closer in time, what about the ceasefire in the Iran/Iraq war? Will it hold? Will we have a peace treaty? What are going to be the consequences on oil output and oil prices? Will they be higher or lower? How can we fit such upheavals into the forecasters frame of mind? The answer is, of course, we cannot.

What, however, has been acknowledged in all the turmoil, is that in the long run, the marketplace will exert itself. And that brings me to OPEC and its key role in shaping the world oil market.

Although OPEC was founded in 1960, the organization had little influence on prices during the 60s because it had no real market power. However, the entrance of independent and national oil companies from consuming countries provided OPEC with the opportunity to manifest its presence with increasing effectiveness. This also marked the beginning of major structural changes in the world oil industry which paved the way for the revolutionary developments that followed. OPEC jumped on the opportunity created by the 1973 oil embargo. It was then that OPEC completely took over the pricing of its oil and an entirely new set of oil relationships was created. During OPEC's price reign, oil prices jumped from $2/b to over $40/b on world spot markets.

When OPEC did exercise market power, it didn't do so hastily but usually took its signal from the spot market. Panic buying to cover temporary shortages precipitated by political events caused price hikes in 1973/74 and again in 1979/80. OPEC followed the rise in spot prices with some lag, but then very rigidly.

Eventually, the group lost almost half its markets, while others continued to increase market share. This happened because OPEC refused to lower its prices once the temporary tight market conditions had changed. While OPEC members will insist that this rigid and almost immovable high price system was intended to ensure stability, they made the unforgivable mistake of ignoring market fundamentals and consumer response. They even believed that any future increment in demand would automatically accrue to OPEC because non-OPEC production could not possibly cover it.

OPEC's policy of defiance and rigidity, ignoring fundamental market cause and effect, backfired and the group had to pay the price. It dampened demand excessively while at the same time encouraging significant growth in non-OPEC supplies. Inevitably prices began to escape from OPEC's control. In hindsight, one wonders why the market signals were ignored for so long and changes in the system were not instituted earlier. But OPEC was not alone. Before we embrace the 'I told you so hindsighters', I would remind you of all the corporate projections, the many government forecasts, the expert predictions and the rhetoric that flowed from financial analysts and academics.

Today we know that the demand response to prices is relatively inelastic over the short term. We have also learned that most producers are equally inelastic in their response to price changes because their behaviour is largely dictated by their high capital investments and the low marginal producing costs.

All this enlightenment has solidified itself since the 1986 price collapse. Many will argue, that had there been consensus earlier, the 1986 overreaction could have been avoided by not compressing into a few months what should have been a longer run change. Personally, I cannot accept this. Every market has a dynamism of its own which will defy institutional correctives.

Experience has shown that a fixed-price policy is not workable without great sacrifices on the part of its sponsors, for example, the swing producer role that was assumed by Saudi Arabia. And while we all speak of the virtues of a stable price environment, in the real world, markets are changing constantly due to shifts in demand, supply or both. The so-called equilibrium price can be very elusive in such a world. Trying to defend a price that is not close to the long-term market-clearing level has been demonstrated to be a futile and very expensive exercise.

Producers and consumers now understand better that oil markets are inherently unstable. While this has been the case with all commodities throughout history, maybe we needed to be reminded that oil markets also tend to overreact and overshoot. And we know today how damaging and disruptive such violent fluctuations can be.

But we also need to keep in mind that in the late 1970s and first half of the 1980s, massive amounts of capital were funnelled into the Canadian and U.S. oil and gas industry as well as other parts of the world, chasing $50 oil and $9 gas. As a consequence, for example, the drilling and service sectors overexpanded in Canada and the U.S. beyond any reasonable notion of prudently managing their growth. As well, around the world, outside OPEC, significant amounts of oil and gas were found based upon escalating forecasts of prices.

Where do we go from here? The brief flirtation with a totally free market environment, and the subsequent collapse of oil prices, was not to the liking of any of the market participants. There is now growing consensus that the only practical way of bringing some degree of stability to prices, given the present high surplus producing capacity, is supply management. And it is perhaps ironic that after many years of OPEC bashing, we are looking to that same group to assume the role of market regulator, at least in the short term. Whether or not they can successfully fill that role is still an open question. We all hope that OPEC will muddle through as they have often done in the past, but new pressures are mounting. The present situation is another illustration that a solution may indeed be beyond OPEC's power.

The current OPEC policy places strong emphasis on volume as the main regulator. The production ceiling is adjustable; it allows for variations in quotas on a seasonal basis. There also is the new concept of a target price which is fixed, but it is based on a basket of crudes rather than the previous single marker (Saudi light). Experience has already demonstrated that this is not workable either and price ranges at much lower levels are contemplated.

The new policy strategy aims to create a more durable equilibrium between potential supplies and demand growth at realistic price levels. Certainly from the Saudi perspective (and that includes some of the other Gulf producers), whatever the price, it must allow for demand to grow. The 1986 experiment has opened the door for some growth and OPEC is hoping that a market share of 20 million barrels a day may soon be realized for their members. Total productive capacity will remain considerably above this level well into the 1990s and downward pressure on prices will be a constant companion. But a market of 20 million barrels a day would relieve some of the pressure within the group and would make the task of supply regulation more manageable. Against this global background, what are the chances for major developments in the North? How would northern projects fit in? What are some of the factors that will influence the decision process?

I have dealt with price which will be the most important single factor. Supply is probably the next important aspect. Conventional supplies of light crude (the most desirable feedstock for Canadian refineries) from the West are on an irreversible slide. Our best estimates suggest that by 1995 productive capacity will be 15% or 150 kb/d lower. Fifteen years from now, that capacity is expected to be 40% lower. Unless we have some pleasant exploration surprises in the Western Basin, which we do not expect, there are only two sources for replacement supplies: the oil sands and frontier production. Both are high-cost and at least initially, because of economics of scale, both are in the megaproject class.

From a supply point of view, I am assuming that Canada would want to replace the declining capacity rather than relying on imports which are not without risk despite the global glut in oil. While essentially all future supplies are going to be high-cost, there are significant differences which may necessitate a choice or priorities in choosing when, what and where to develop.

The oil sands have no geological risks and we have known production technology which has been improved considerably since production first commenced. Industry is anxious to put this advanced technology to work in a grass-roots project which has been identified as the Oslo project. The oil sands also have an advantage geographically: they are close to markets and are already an integral part of the existing infrastructure.

Frontier supplies have been identified in threshold volumes in the eastcoast offshore region and in the far North. Both supplies can be developed and produced with known technology, although the challenge remains formidable. But there is a significant difference which weighs heavily in considering these two supply sources. Eastcoast offshore oil can be readily shipped in tankers; northern production requires a long overland pipeline which is a megaproject in itself. This is a major handicap and economic disadvantage versus the other supply possibilities.

Therefore, in order to advance northern development on the priority scale, other considerations would have to come into play and regional development aspects come immediately to mind. Regional development through megaprojects has been part of Canadian economic development and growth since Confederation and no doubt it will remain an integral part of Canadian economic policy. Timing will be the issue, not development per se. And once the threshold project is in place, the situation changes dramatically.

Regional development is a political decision. The private sector can be encouraged by various means to deliver. In our case, we have the capability to develop these oil and gas resources and a market is readily available, two major requisites in any regional development decision. Recent announcements are an indicator of how the governments intend to handle regional development and how the industry fits in.

The government's financial involvement must be viewed in the context of the recent tax reform which impacted significantly on major projects in the oil and gas industry. The government recognized the consequences early in the discussion and stated that megaprojects would be looked at on a case-by-case basis. If one puts pen and pencil to the recent agreements, it soon becomes apparent that the financial arrangements compensate for the tax incentives that were removed by the tax reform. Overall it achieves the Finance Minister's objective to put government revenues on a more secure and predictable basis.

Let me summarize. We have threshold reserves in the North and have the technology to bring them onstream. The geological prospects in the North remain promising and attractive. The current and foreseeable world oil price however, is not conducive to northern development. The geographical location of northern oil and gas fields is an additional drawback. To make development a reality will take a great deal of imagination and will require the fullest cooperation of all involved parties. The economic spin-offs that any major project in the North could generate are significant and will have to be weighed in any development decision. For example, a one billion dollar investment in an oil and gas project would create approximately 20,000 direct and indirect jobs. But, hope of wealth through economic rent from northern projects will have to remain a dream for a long, long time.

QUESTIONS/DISCUSSION

Robert Brown: I find it difficult to believe that there are threshold values in the North when you consider the Alaskan experience.

Hans Maciej: As I said, it takes some imagination, even with improvement in prices, but, if you look at Mr. Leske's presentation on Alaska, certainly the threshold project is the most costly one. The economics change dramatically once the threshold project is onstream. Now with regards to a pipeline, that presents a number of possibilities and certainly we don't have to go the route that Alaska went by having 9 and 10 dollar tariffs at the outset and now down to 2 dollars a barrel. An equalization of tariffs presents a possibility. Also, certainly, we have learned a lot about construction technology etc., - that should reduce development costs. I would suggest to you that the Amauligak structure indeed presents a threshold project.

Michael Jarvis: But that's not by itself, unless there's other oil being produced?

Hans Maciej: It will go on its own. But with the consideration of that, you have all the other things that eventually will attach to that project for which the economics are different and yet the same companies may be involved in the projects that come along. So, even from a corporate point of view, you have some average considerations that enter into the picture.

That does not mean, of course, that Amauligak is going to be the first project. Because, you can already see from corporate plans that there is an eye on the possibility of moving some crude as room becomes available in the Trans Alaska Pipeline System. Amoco is going to concentrate exploration next year, as I understand it, on the western part of the Beaufort Sea in closer vicinity to a pipeline outlet. If the oil is to come overland and attach to the infrastructure that exists from Alberta, this is a very important consideration because you have to keep in mind that we will be emptying that infrastructure unless we replace it with synthetic crude and with heavy oil. So there's an attractiveness in taking advantage of that pipeline capacity down the line. That says you should bring it overland to tie into the Interprovincial Pipe Line and Transmountain system.

2.6 NORTHERN OIL AND GAS MANAGEMENT POLICIES

Richard H. Matzke
President
Chevron Canada Resources

This conference on Northern Hydrocarbon Development in the Nineties presents a marvelous opportunity for people of many diverse interests in northern petroleum exploration and production to come together to discuss problems and opportunities associated with this timely topic. Hopefully, enough ideas will be generated to set the stage for the next decade which will be a very important one for northern development. It seems to me that politics and technology are now coming together in Canada in a way that the aspirations of Canadians in general, and Northerners in particular, can be realized.

Northern oil and gas management and regulation offers at the same time, many pluses and minuses, many opportunities and many pitfalls. It poses many difficult problems but provides opportunities such as the possibility of major discoveries that if achieved will more than offset the problems.

The large but little explored land mass and offshore waters of northern Canada offer oil and gas explorers opportunities unequalled almost anywhere on the globe. The Mackenzie Delta, the Mackenzie Valley, the Beaufort Sea and the Arctic Islands encompass an area of about 450,000 square miles - an area twice the size of Alberta - and it all has potential for oil and gas exploration and development. The estimated potential reserves in this area of northern Canada are 15 billion bbls. of oil and 150 TCF of gas according to a recent Geological Survey of Canada report.

Since land dispositions in much of the area have been in a political freeze for many years, the current managers have an excellent opportunity to make a fresh start and attempt to avoid mistakes made elsewhere. They also have an opportunity to consult with all interested parties - governments, northern residents, industry members now working in the North and those not now in the North who want to work here.

With the reserve potential I have mentioned, the North can be looked at as the answer to future energy shortages for Canada, jobs for Canadians, and the source of funds from exports. The manager must know these possibilities but must also know that the environment is fragile, the elements are severe, that local people and especially native people have aspirations which might be substantially different from those who live South of 60.

The manager must also know that explorers and developers must be attracted to an area by reasons other than the technical challenge alone. The art of regulation or management itself poses contradictions. How does the manager balance certainty versus flexibility or the interests of an explorer versus a local resident? The perspective of many groups of interested individuals must be balanced. Different meanings and different results are obtained if you are an oil and gas explorer being regulated or a citizen owner of the resource which the oil and gas company wants to find and exploit.

The manager or regulator, which in the context of northern Canada, is the composite image of multiple governments, I assume will want to encourage exploration to develop resources so that long term jobs and skills are created, energy sources found and developed and wealth is created to finance the multitude of programs politicians institute to serve the needs of their constituents.

The manager will also want to facilitate exploration and development. Investors will not invest in a place that discourages their presence at every turn. One of the ways to facilitate this is through certainty of rules. Investors like to know the rules of the game in advance and although not all of the "i's" need to be dotted, nor all "t's" crossed, they want to know that the rules of play will not be changed before the final bell is sounded. They want to be able to plan and live within their planned activity.

The oil and gas manager cannot be a "yes man" or only an industry advocate. Nor can he or she be an obstacle. The manager must recognize and represent the people of Canada and especially the people of northern Canada. He or she must recognize the need for the discovery of more oil and gas sources not just for northern Canada or the explorer but for the nation - sources to replace Canada's dwindling reserves for our own use and for export, if necessary, to provide income. The manager must protect the resource, protect the environment and protect the people of the North.

Do I, an explorer, recognize the multiple roles of the regulator/manager? Yes, I think I do. What do I want and expect from the management regime in northern Canada? Realistically, I do not know for sure because the management regime is just now developing. As an officer of a company which is currently exploring for oil and gas in northern Canada, I do, however, have certain requests of the northern regulator:

1. I hope there will be only one of you. I ask that the various federal and territorial governments and government bodies come together and give me one path to follow in my dealings with you. Hopefully, native land claims settlements will not interject another set of regulators and regulations which might duplicate or contradict the existing set nor will local communities have a separate management role. It would be much more effective if the legitimate concerns of all interest groups could be managed and expressed through one coordinating body. I ask for the one window approach to approvals and regulations. I know that this is now very difficult since, for example, native land claims are unsettled and devolution of power is being negotiated through a Northern Accord.

   I agree with the recently published report on energy options in Canada which states:

   > "Northern energy development should proceed with increasing participation by Northerners by expediting efforts to settle land claims; allowing decision-making at the community level; further cooperative efforts between local communities and the private sector; and further devolution of powers to the territorial governments."

   I hope that while cooperative efforts are ongoing, the manager will permit us to proceed with assurance that the rules will not be changed in the middle of our project as a result of shifting powers from one body to another.

2. I hope that you, your officials and employees will be fair and competent. I think many will admit that the expertise and infrastructure to run a comprehensive regulatory regime does not yet reside North of 60 at this time. Governments should recognize that fact and move quickly to put together the people power to formulate, initiate and administer such a regime. The people doing the managing will be "put to the test" on many occasions and will need to demonstrate their abilities from day one.

3. I hope that you will develop and issue a fairly clear set of rules governing nuts and bolts issues; such things as:

   (a) bidding for lands
   (b) work commitments
   (c) royalties and taxes
   (d) involvement of local people
   (e) local benefits
   (f) environmental protection
   (g) safety
   (h) right of surface access
   (i) pipeline rights-of-way

   Suitable rules have been developed elsewhere in Canada and we think they can be adapted to the North with sufficient flexibility to suit local needs. In fact, it can probably be said that a comprehensive regulatory regime is now in place through federal statutes and regulations which would be adequate for foreseeable needs.

4. Set some goals for yourselves and have a plan for the future. Don't wait to react to us and our proposals. I think the regulator must take a broad and long term view of development. For example, put together a land disposition calendar so that exploration can be carried out in an orderly fashion - so that the environment can be protected, so that native business people and workers are not replaced.

5. I hope you will consult me as we go along this route. I hope you will acknowledge that I am here for the long haul - that I want to husband the resources of the North as well as anyone else, that I wish to protect the environment, that I want to work with local people as well as making a buck.

From my own company's experience at Fort Good Hope, we know that all of these issues are tied together. We have formed a joint venture with the local community which recognizes amongst other things:

(a) the local community's need to participate in decision-making relative to our exploration program. They want to share management rather than just providing labour.

(b) they want us to recognize the importance of the environment and to look to them for leadership in protecting the environment.

(c) they want to get more out of the relationship than a few dollars. They want training, development opportunities and long term benefits. They want to develop entrepreneurial skills at the same time as they protect their community from drug and alcohol problems.

(d) they want to protect and enhance their culture and history while at the same time provide alternatives for the present and future.

(e) they want to find oil, develop resources and create wealth.

In other words, they want to be real partners who contribute to the enterprise with the expectation that their efforts will result in a better overall project. This joint venture project demonstrates Chevron's commitments to good citizenship in the North and should show the manager and regulator that we have something to offer in communication with him. Other companies now operating in the North have also demonstrated good citizenship in many ways.

Let me conclude by repeating my initial thoughts. Oil and gas development in northern Canada will present many technical, political, environmental and regulatory problems, but the possible rewards make it more than worthwhile to overcome those problems. One of the pluses is that the regulators have the opportunity to make a clean start and "do it right the first time".

2.7 NORTHERN HYDROCARBON DEVELOPMENT IN THE NINETIES: NORTHWEST TERRITORIAL VIEW

The Honourable Nellie Cournoyea
Minister
Energy, Mines and Resources
Government of the Northwest Territories

With recent announcements from both the public and private sectors we continue to experience change and progress. An excellent example of the transition we are facing is the new Amoco Canada. With its recent acquisition of Dome Petroleum, we now have a significant new player in the Beaufort. And I must say, I welcome Amoco's increased presence in the North. I would like to mention some of the other positive changes we have seen over the past several years.

While we no longer have generous exploration incentive programs and high world oil prices, Gulf Canada and partners still managed to delineate the Amauligak field. Esso Resources is delineating its Taglu gas field. Also, Esso has entered into a joint venture with Chevron for a near-shore well this winter using an ice-strengthened platform. Chevron Resources will be drilling its first wells near Fort Good Hope.

We feel confident that full-scale development of the oil and gas resources of the Mackenzie Delta and Beaufort Sea will occur in the 1990s. With pipelines in place, we can look forward to continued, long term activity. However, we must turn our attention to being prepared for the impacts and opportunities such development will bring to the North, and the new responsibilities our government will assume.

We have already had experience with the Norman Wells pipeline, which was brought into service in 1985, without the social, economic and environmental disruption many feared. It is now carrying 30,000 barrels of oil a day.

The land claims situation has also changed considerably. As you know, the Inuvialuit have settled their claim. The Dene and Metis recently signed an agreement-in-principle for their land claim; with a final agreement about two years away. If all goes well, the agreement-in-principle for the Tungavik Federation of Nunavut (TFN) claim in the eastern Arctic should be signed this spring. And, of course, the Government of the Northwest Territories has entered into an Enabling Agreement with the Government of Canada for the negotiation of a Northern Energy Accord.

It is safe to say that the attitudes of northern residents about development have become much more positive in the past decade. All wish to see development, providing that it occurs with our participation. It is expected that development can occur without threatening the environment, and that it can complement traditional lifestyles. To a degree, these fundamental conditions are being met, and through continued attention, can be maintained as development proceeds.

Since we are in a period of low industry activity, and at the beginning of the transition from exploration to development, there could not be a better time to address the issues relating to oil and gas management in the North. These issues have to be resolved in order that full scale development can occur.

I would like to bring to your attention some of the implications the Accord Enabling Agreement has for northern residents, for industry, and for the future development of the hydrocarbon resources of the North.

As Mr. Patterson described to you, the Enabling Agreement for the Accord is of tremendous significance to the political and constitutional development of the Northwest Territories. Management of resources is the one major area of provincial-type responsibility which the Government of the Northwest Territories does not yet have. The Northern Accord Agreement marks the initial phase of transferring federal jurisdiction over non-renewable resources to the Northwest Territories; a major step on the road towards provincial status. Also, the Accord will provide for a stable and fair management and regulatory system.

Industry has faced more than the vagaries of markets, prices, and the high costs of operating in the North. It has faced an uncertain management and regulatory regime that has inhibited activity. The regime has also operated with very little northern support and involvement.

Our government recognizes the need to build upon the oil and gas management regimes found in southern Canada. This principle is affirmed in the Accord Agreement. However, it must be stressed that the system that will operate in the North will not be transplanted from southern Canada.

To those residents of the Northwest Territories who are concerned about the merits of our Northern Accord Enabling Agreement, I can assure you that the Government of the Northwest Territories will negotiate for, and implement, an oil and gas management system that is reflective of northern concerns and issues, as well as the needs of Canadians and industry. It will recognize the interests of the residents of the North in the management of non-renewable resources. It will also be compatible with the unique management and regulatory structures that will exist in the NWT because of aboriginal claims settlements. As you know, one of the purposes of the Accord Agreement is to protect any oil and gas-related rights and interests following from land claim settlements. Linkages will therefore have to be developed between the regulatory structures created through the Accord and the new agencies that will be established under claims.

The financial implications of the Accord are obviously of great importance. Oil and gas revenues will alter the fiscal relationship we have with the Government of Canada. We welcome the opportunity to participate in the development of oil and gas in the North, with the expectation that the royalty system will provide the Northwest Territories with a degree of self-sufficiency, and will decrease our dependence on the federal government.

Realistically, the Government of the NWT will face tremendous demands as a result of development activity. The issue of providing sufficient resources to communities to deal with the impacts of oil and gas development is still outstanding. We must also address the existing deficiencies in our infrastructure, and the measures we will need to put in place to encourage the establishment of northern based petroleum service industries.

The Final Accord will be negotiated bilaterally, between the Government of the NWT and the Government of Canada. However, there is clearly a need for extensive consultation and involvement with other groups and interests before, and during the negotiations. Arrangements

must be developed for appropriate management of the Beaufort Sea. These arrangements must recognize involvement by the Yukon, commensurate with their interest in the region. Close communication and consultation will be required with industry throughout the negotiation and implementation process. Most important, our government is committed to meaningful participation by the northern aboriginal organizations in developing the positions that we take to the negotiating table. This input will be of critical importance to the GNWT negotiators.

It will not be clear sailing over the next year or two, I can assure you. We are facing a very complex task, with many interests at stake. Northern aboriginal groups, the Yukon, federal agencies such as the Department of Indian and Northern Development (DIAND), Energy, Mines and Resources (EMR) Canada, Finance Canada, the Canada Oil and Gas Lands Administration (COGLA), and, of course, the industry all have an interest. The long term importance of the issues to be dealt with through the Accord cannot be underestimated. I would like to stress that the Enabling Agreement provides a framework for future negotiations. The substance of the Final Accord will be developed and modified through negotiations whereby we can achieve several of the goals and issues I have outlined. As the negotiations progress, ground will be set for rumours to flourish. I would ask of industry, who have been patient, and at times concerned observers of the Accord developments to date, to maintain an open dialogue and close and regular contact.

I should note that the transfer of administrative and legislative powers for onshore oil and gas management, and arrangements for shared offshore management responsibility, will occur in stages. Joint arrangements will be put in place to share decisions regarding onshore management where transfers have not yet been made. Phased implementation is one of the important principles established through the Enabling Agreement. The transfer of powers and responsibilities will be staged, over a number of years.

With the signing of the Accord Enabling Agreement, the Government of the Northwest Territories now, finally, has the opportunity to become much more actively involved in ongoing oil and gas management issues. Our government intends to take full advantage of that opportunity. You will be seeing a greater presence of the GNWT in Calgary and Ottawa on oil and gas issues affecting the North, and indeed all of Canada.

In order to proceed effectively and expeditiously with the negotiation of a Final Accord, and to undertake other related initiatives in the non-renewable resources sector, the Government of the Northwest Territories must strengthen its capabilites and resources. A new Department of Energy, Mines and Petroleum Resources will be established by the Government of the Northwest Territories in the very near future. It will provide the organizational structure, and add to the expertise required by this government to deliver the responsibilities that will be given to it through the Accord.

Accord negotiations will be guided by a sub-committee of Cabinet including myself as Chairman and as Minister Responsible for Energy, Mines and Petroleum Resources, the Government Leader, the Honourable Dennis Patterson, the Minister of Finance and of Justice, the Honourable Michael Ballantyne, and the Minister Responsible for Aboriginal Rights and Constitutional Development, the Honourable Stephen Kakfwi.

In closing, I must acknowledge the tremendous dedication and commitment that the Minister of Indian Affairs and Northern Development, Bill McKnight, and Prime Minister Mulroney, have devoted to the goal of the Northern Accord. On behalf of the Government of the Northwest Territories, I congratulate them for their courage and determination to see that Northerners and their government will manage the development of our oil and gas resources in the future.

As I am sure you realize, some share the view that northern resources should be managed by the federal government, for all of Canada. If I have not done so already, I should make one point very clear. Northerners must have responsibility for the management of oil and gas resources, if development of these resources is to take place. If all goes well, the Final Accord will provide for the responsibility we require. Northerners want to see Canada's resources developed, and because we want development, we will see these negotiations through. I look forward to establishing our new department and our negotiating team, and to the challenges to be faced in the Accord negotiations.

2.8 NORTHERN HYDROCARBON DEVELOPMENT IN THE NINETIES: FEDERAL VIEW

Jacques Gérin
Associate Deputy Minister, North
Indian and Northern Affairs Canada

While going over the program of the conference and observing the sessions this afternoon, I realized how much we have learned in the last 10-15 years. The subject matter covers all facets of development: cultural, political, international and indeed global issues. Participation has been broad and diversified.

Undoubtedly our view of development has matured. It was not so long ago that we had on one hand the "developers", and on the other, those "against development". Developers were those who drilled holes in the ground and all the others were categorized as various kinds of "anti". When I came to Environment Canada in 1977, the war was on between the "pro" and the "anti". And when I started saying that our business was development, many people felt I was perverting the meaning of the word. You are all familiar with the story Tony Penikett repeats often enough concerning mining in the Yukon: the mineral ends up in Japan, the jobs in Alberta, the profits in Vancouver or the U.S., taxes in Ottawa and the Yukon is left with a hole in the ground. That kind of development led to lots of confrontation and hostility and not, it would seem, to much action. But it also led us into a real learning period and quiet action on a number of fronts.

In the immediate post-1973 energy shock, we spent a lot of money on research concerning physical and natural phenomena and learning more about the physical environment. And that has stood us in good stead. We did not pay enough attention to the other dimensions of development.

All this led to Tom Berger's report in 1976, perceived by many as the monkey wrench that stopped the action and put the freeze in the Valley. But what Tom Berger was really about was first, that he put the North on the map. This became a political event probably still unmatched in terms of bringing northern issues to the South. Second, his report was about time needed in order to learn and make progress before we jumped into the big stuff. And the verdict tonight is that we have learned.

Witness Justice Berger's verdict on the signing of the agreement-in-principle with the Dene-Metis. Look at this conference and the people who are here. Look at the kinds of development taking place in the North:

- of political institutions;
- of people assuming responsibility;
- of diversification of an economy that is still fragile and volatile;
- of economic development strategies à la Yukon 2000;
- indeed a unique society emerging in Canada and taking on its own future.

Even the federal government has learned something! And that's got to be worth celebrating!

If you have heard or read the Prime Minister's speech in Yellowknife on September 6, 1988, you might have noticed how he placed the significant development of the past month in a context of development in the fullest sense of the word. And I quote from his statement:

> "With the Northern Accord we are fulfilling one of the key elements of our overall framework for northern political and economic development. It honours the pledge made in our Frontier Energy Policy. The touchstone of our northern strategy is the steady transfer of political power and taking the decision-making authority away from the central government to the territorial level. We are convinced that the economic, social and cultural needs and goals of Northerners can best be achieved in a political environment where most political decisions are made in the North by Northerners for the benefit of Northerners."

The two characteristics of federal policy towards the North are:

- A clear objective: the promotion and development of northern institutions. And that is historic. It is the first time, to my knowledge, that the federal government explicitly states that its objective in the North, that the national interest in the North, lies with greater responsibility to Northerners.

- That we are moving on several essential fronts at once:

  - the promotion of economic development
  - the settlement of aboriginal land claims
  - the transfer of responsibilities to the territorial governments
  - the enhancement of sovereignty

  All four are essential and mutually reinforcing. Progress on one is what permits progress on the others. And this may be what we as feds have best learned.

The signing of two agreements-in-principle, in Fort-Rae on September 5, and in Yellowknife on September 6, is more than coincidence. It is a highly visible symbol of the fact that in a comprehensive approach to development, the development of people and their institutions is as important as the development of natural resources. Both those agreements-in-principle are fundamentally about the same thing: shift in power and responsibility from the South to the North. More simply, as put by the Prime Minister, they are about justice. And, neither is a panacea. Neither abolishes all difficulties. What they are, are signs and instruments of progress. Important signs of progress.

Those of you who were at Fort-Rae will remember that the Dene and Metis took a good four hours to tell us about their concerns. The sense of a historic step being achieved and the continuing sense of the fragility of their people in the face of the momentous changes that we, from the South, can and do bring.

Progress on this claim and others is essential to achieving other objectives. Claim settlements provide confidence, they provide clarity to both aboriginal people and others, North and South; they ensure participation of the aboriginal people in the institutions of society; they provide an

economic base for development activities beneficial to themselves and to all. And progress is continuing. We are now moving with the Dene-Metis towards land selection and negotiation of a final agreement. We are very close to the agreement-in-principle with the Council of Yukon Indians (CYI), and the Inuit claim is proceeding along in its own quiet way.

The agreements-in-principle with the Yukon and the Northwest Territories Governments on a Northern Accord are also a sign of progress. And again they are not a panacea. They will not, by themselves, start a stampede, certainly not with $13 oil! But they represent real, historic progress. You all know how difficult negotiations in the North tend to be. But what about negotiations in Ottawa! It is okay to transfer things like education (20 years ago already), health or municipal services. But energy!

These agreements-in-principle give us a framework for detailed discussion and consultation on how it will all happen.

The principles are clear:

- onshore management regimes will become the responsibility of the territorial governments;
- there will be joint federal-territorial management of the offshore;
- revenues from oil and gas activities will accrue to territorial governments (and to aboriginal people as provided in claim settlements). These revenues will offset partially the transfer payments from the federal government so as to reduce the dependency of the territorial governments on federal transfers.

The Accords will have immediate consequences:

- first, consultation and partnership with the territorial governments on ongoing activities - the development of Amauligak, the gas pipeline from the North, and most importantly the issuance of rights;
- territorial governments will begin the development of onshore regimes from principles to regulations. And that will lead to the gradual transfer of responsibilities as capacity is developed. The priority is onshore. That's where territorial institutions can be developed and will be part of their eventual management of all lands and resources;
- and the development of a joint management board for the offshore.

Thus, the direction is clear and similarly the commitment to careful, gradual, incremental implementation:

- time to consult with the partners, particularly native people and industry;
- time to develop appropriate institutions in the North;
- time to acquire the necessary professional expertise;
- time to bring principles to detailed operating practices, right down to the handbook.

All parties share a desire for a smooth, gradual transition with minimum uncertainty. Of course it will not be that smooth and it will be messy. Development is messy. Change is difficult and messy. But we have been as careful as we have ever been to keep the perspectives broad and not exclude any partners, to make the steps gradual and to work in harmony towards

objectives shared in common. This work and progress with the development of northern institutions is the most important contribution the federal government can make. Much more important than the provision of subsidies.

So we have indeed learned. And everyone here tonight, and all those we work with and those we represent, have been active participants in the learning process. So let's congratulate ourselves on what we have learned, on the progress made, on what we have already accomplished. This is not to minimize the challenges and the difficulties ahead. As I have said throughout, there are no panaceas. And the future will be just as messy as the past. But, we can justly hope, that whatever wisdom we may have acquired with such difficulty and such pain, the sum of all our errors, that wisdom will guide us in the constructive steps ahead.

Development in the North will achieve what it should: work for the well-being of all Northerners. And Canada will be a better place for that.

CHAPTER 3

NORTHERN HYDROCARBON POTENTIAL

3.1

HYDROCARBON POTENTIAL OF THE NORTH: AN INDUSTRY VIEW

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I will be making comments about the hydrocarbon potential of the Arctic Islands, the Beaufort and the Mackenzie Valley, focussing mainly on the Beaufort. It is close to 20 years since the first discoveries in the Beaufort and in the Arctic Islands. I have had some association with these northern areas through most of this history, some of it very close at hand, and I have seen resource estimates move up and down over the years, depending on various drilling results, so it is not without some trepidation that I make statements about resource potential.

As you are aware, the resource potential of any given area is fundamentally what drives industry's interest, or lack of interest in making exploration investments - obviously the necessary precursor to oil and gas development. This potential is considered not only in terms of the total amount of oil and gas that might be found, but also in the kinds of packages it will come in - the size of the pools in terms of recoverable oil and gas, and the facility of the reservoir to deliver those reserves. This relates to reservoir quality, and areal concentration of reserves or pay thickness. At the outset it is the pool size and quality aspects which are most important, and they are the keys to realizing development of high cost frontier areas such as the northern basins of Canada.

Initial oil and gas development is not only significant in terms of initial production, revenue, and jobs, but perhaps even more importantly, it brings with it the development infrastructure which provides the incentive to pursue the remaining resource base. The success of this further pursuit in turn determines the ultimate magnitude and length of the production profile.

These considerations, and others, make me cautious about prognosticating what the end result is likely to be in our northern areas, but I would like to think we now have enough drilling history to put us in the correct ballpark as to resource potential, and to make realistic judgements as to how the production profile might look, although we still face a lot of uncertainty as to exactly when production will start up. Whatever confidence one might place on today's northern resource assessments, I still wonder what the reserves of our northern basins will really look like after a production history comparable to the western Canada basin, since the Leduc discovery in 1947!

Perhaps it may be instructive to look at the reserves build-ups in western Canada over the last 41 years, and compare them with those of the Beaufort and Sverdrup Basin of the Arctic Islands, the northern areas with the most established reserves.

Figure 1 shows cumulative conventional reserve adds for Alberta, for both oil and gas, since 1947, in billions of barrels and TCF.

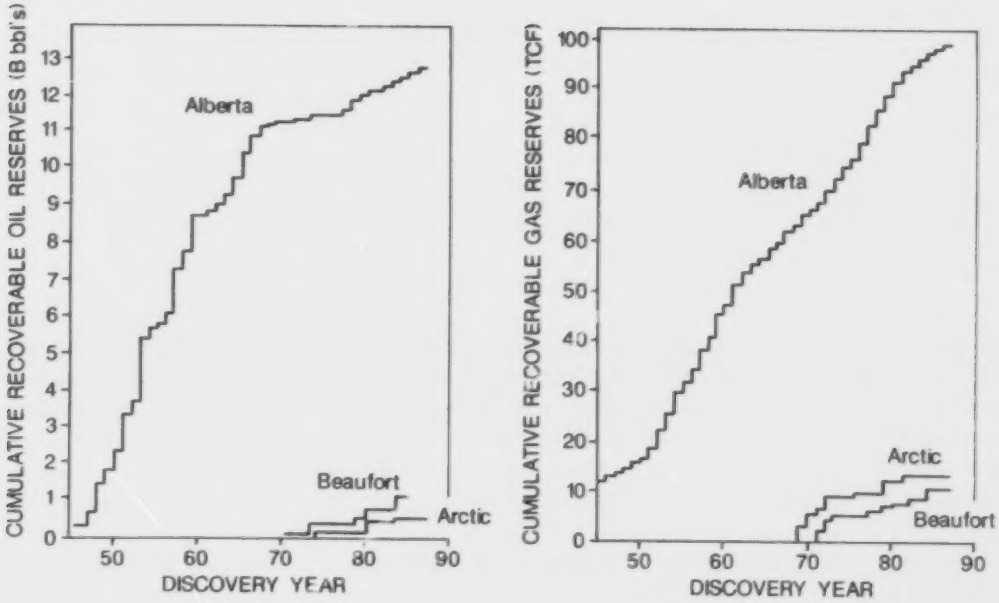

Figure 1

It has been conventional wisdom that once the geologic key to hydrocarbon occurrence in a basin is found, then the big pools and thus the big reserve adds, come relatively early in the basin's history - everything else being more or less equal - such as the physical, regulatory, and demand/price environment. This is exemplified by the oil reserve add curve which is initially very steep, then flattens out post-1968. One can conclude from this, that future oil adds will be modest and that the undiscovered potential is limited. Gas on the other hand, is still on an upward trend, suggesting that there is substantial undiscovered potential for this commodity.

Figure 1 also has the comparable curves for the Beaufort and the Arctic Islands. I would like to make two points - neither of which is necessarily supported by these charts.

First, the axiom that the big reserves adds come early, whatever early means in absolute terms, may not be the case for certain frontier areas, because of constraints that the physical environment has placed on the location and pace of the drilling. A number of logistical hurdles have had to be overcome and many still remain. This requires the development of new technology, which takes time, and the acceptance of high costs, which generally takes high price expectations and adequate revenue from current production in the western provinces.

Nevertheless, and this is my second point, I think we have had enough exploration in number and spread of wells to tell us that the ultimate cumulative curves for Beaufort and Arctic Islands will not come close to approaching those of the western provinces, and in fact I believe they will likely only reach about three times or so that shown here, as being discovered. But even that represents an important energy and revenue source for Canada - which is another point that I would make.

It is also interesting to compare frontier field sizes with those in western Canada. As an example, Figure 2 shows gas field size distribution curves for Alberta, the Beaufort and the Arctic Islands.

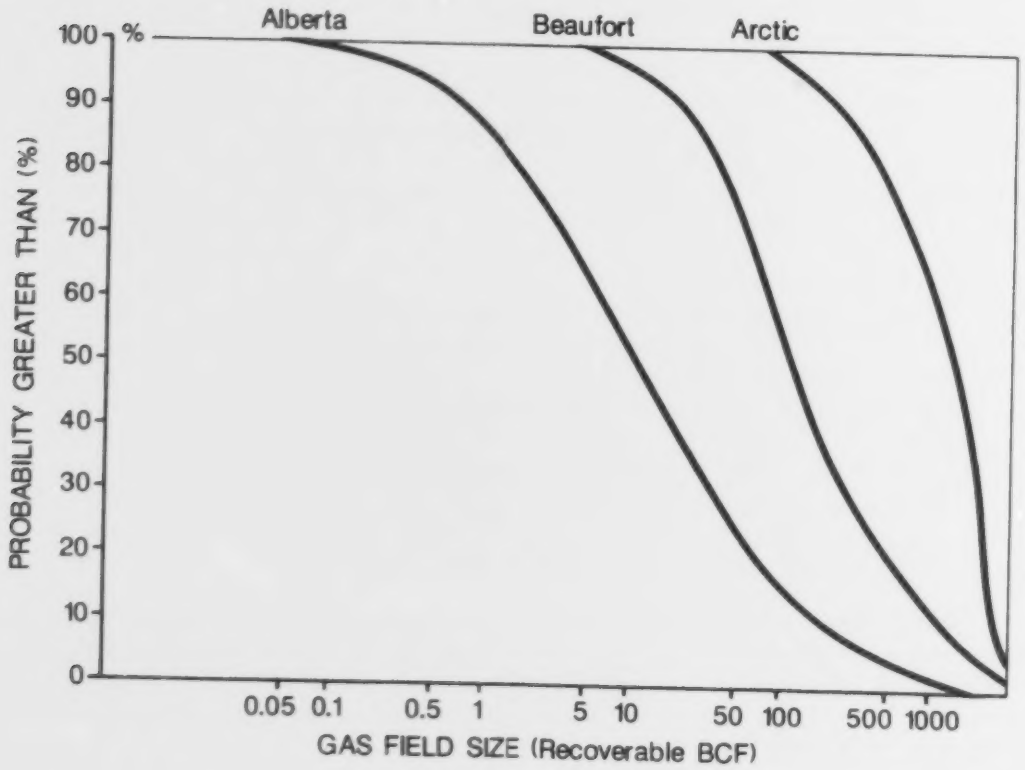

Figure 2

Without going into a lot of explanatory detail on this chart, it simply indicates that the field sizes of the discoveries to date in the Beaufort and Arctic Islands, are generally a lot bigger than those of the western provinces. Note the logarithmic scale across the bottom. It is the bigger pools that are the key to getting these frontier areas onstream and allowing industry to pursue the smaller ones.

Now I'd like to present in chart form a summary of the exploration history of each northern area - the Beaufort, the Arctic Islands, and the Mackenzie Valley, as background for my assessment of how the resource future of the North might unfold.

Figure 3 summarizes the history of the Beaufort - with curves that indicate cumulative oil and gas reserve adds.

BEAUFORT EXPLORATION
INDUSTRY

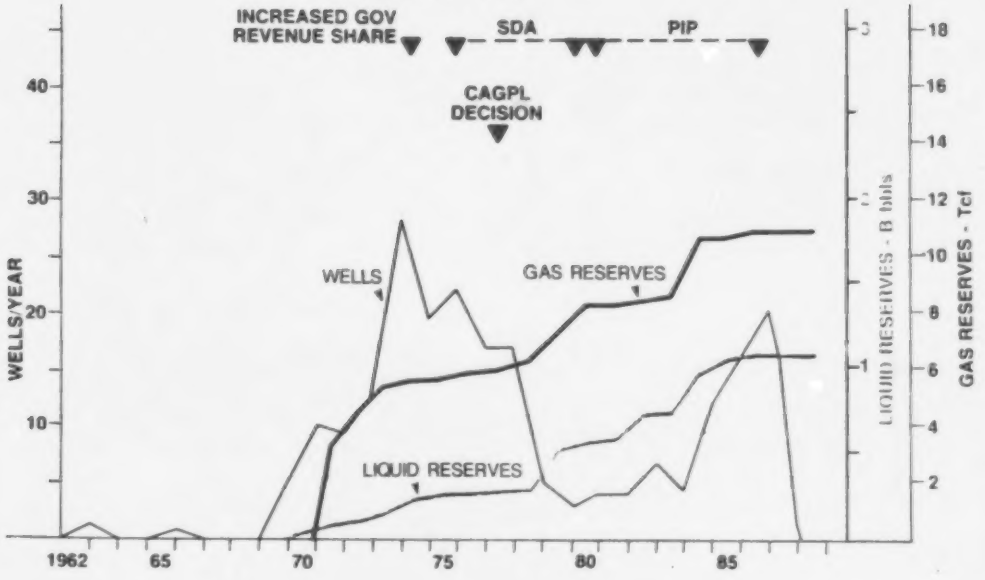

Figure 3

Shown across the top are some factors which have affected the pace of exploration - the first significant capture of oil revenue share by government in 1974 when oil prices moved up, the no-go decision on the Canada Arctic Gas Pipeline in 1977, the period of the Special Depletion Allowance which greatly reduced after-tax costs for expensive wells, and finally the era of the Petroleum Incentives Program (PIP).

Exploration activity in the Beaufort began in the middle 1960s. Closely following the Atkinson Point oil discovery in 1970 came the gas discovery at Taglu in 1971. Activity continued at high levels mainly in anticipation of gas development. Once the Canada Arctic Gas Pipeline project was shelved and the price increases driven by OPEC resulted in abundant quantities of gas being found in the South, the incentive for drilling gas prospects in the North rapidly diminished. Oil then became the focus of attention.

Beaufort oil exploration has had an erratic history with a series of ups and downs. By the middle 1970s many of the attractive onshore structures had been drilled, but not much oil had been found. Industry began moving to the offshore with the realization that the big oil pools were likely to be there. It was only in the early 80s that a complete set of drilling systems became available to properly evaluate the offshore - Esso's island building capabilities and caisson, Gulf's conical drilling platform and caisson, and Dome's drillships and SSDC (Single Steel Drilling Caisson). From the period 1973 to the end of 1986, these systems drilled 80 wells (and made 26 discoveries) but the only significant offshore oil success to date has been at Amauligak. Gas adds have been pretty steady after the initial jump caused by Taglu.

These curves indicate total discovered reserves of something over one billion barrels of oil and about 11 TCF of gas. I should mention that the pool size estimates that went into these curves are conservative in that they do not consider the appreciation that will come with further delineation drilling.

I feel it is not unreasonable to expect an undiscovered potential of 2 to 3 times that of these discovered reserves. This would be a potential of a further 2 to 3 billion barrels of oil and 20 to 30 TCF of gas. But no matter what numbers you want to place on the ultimate potential - either larger or smaller than mine - one must always keep in mind that the size and location of the accumulations, and the quality of the reservoir are the determining factors in how much and how fast reserves will be converted to production.

An example of larger reserves in a quality reservoir in a good location is the Taglu gas field, onshore on the north Delta. At greater than 3 TCF, it is the biggest gas field in the Beaufort, and will be the anchor pool for gas development.

Esso and Shell have each filed an application with the National Energy Board for licences to export a total of some 6 TCF of natural gas from the Mackenzie Delta. This, of course, is just the first step in a lengthy process that would see Beaufort gas onstream in the late 1990s. Initial production will be at least 800 MCF/d, perhaps as much as 1.2 BCF/d. We envisage a transportation system that could carry up to 1.6 BCF/d, and this I see as a reasonable maximum for Beaufort gas production. Although Beaufort gas potential might support a production level higher than this, the timing and nature of future discoveries will likely result in extending the life of this level of production rather than increasing it. This amount of production compares to our 1988 industry production in western Canada of 8.6 BCF/d.

On the oil side, it appears that the most likely development scenario will involve Gulf's Amauligak discovery as the cornerstone pool, again with an earliest onstream time in the late 90s. Depending on the number and size of other pools that would be hooked on, I can see initial production of 200 KBd, +/- 50 KBd.

The size and nature of the resource base is again more likely to sustain this level rather than increase it. But as with gas, this remains to be seen. Production at 200 KBd towards the end of the century would approach 20% of Canada's conventional production at that time, and about 10% of total production, including oil sands.

I will next briefly deal with the other two northern areas. First the Arctic Islands. Figure 4, like the previous one, shows cumulative oil and gas reserve adds and wells per year.

Significant exploration got underway with the formation of Panarctic in 1968, and has been concentrated in the Sverdrup Basin. The biggest gas discoveries came quite early in the exploration history - such as Drake Point in 1969 at 5.5 TCF and Hecla in 1972 at 3.5 TCF. This resulted in considerable euphoria, and assessment numbers ranging up to 100 TCF. The finding rate tailed off as the better prospects became exhausted.

The offshore, however, presented a very attractive target because of its areal extent and the indications of numerous structures. Panarctic developed ice island technology and followed up with the major gas discovery at Whitefish in 1979. But, thought to be of more significance

at the time, were the oil discoveries in 1980 at Cisco, Skate, and MacLean. Subsequent drilling and very detailed seismic investigations led us to the conclusion a few years ago that the remaining potential of the Sverdrup Basin was modest.

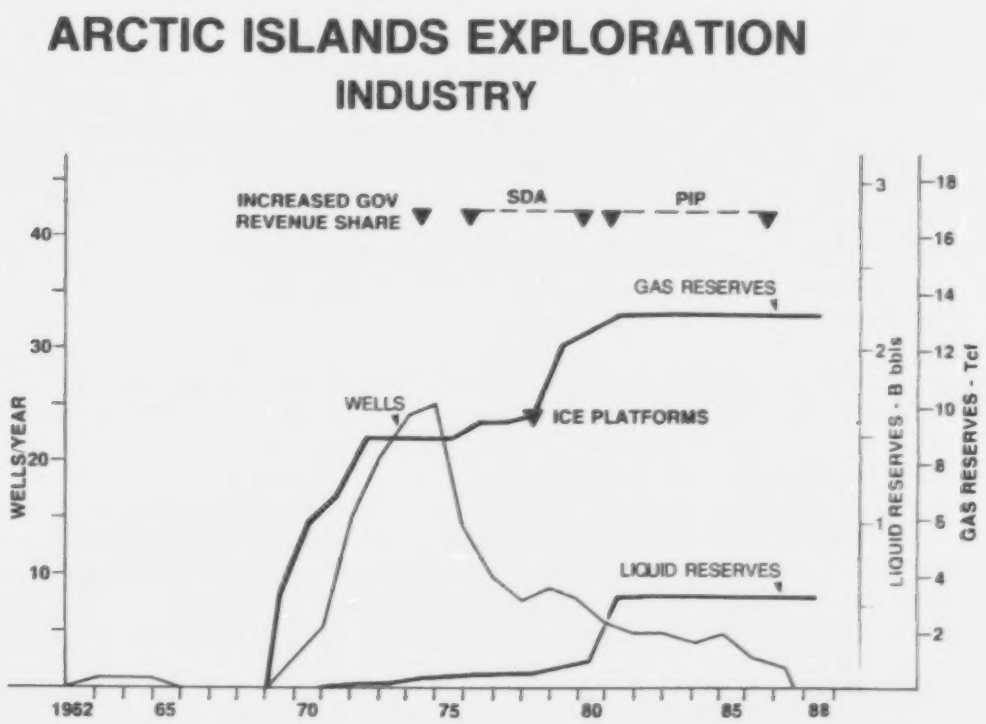

Figure 4

We estimated the discovered reserves of 13 TCF of gas and about 500 million barrels of oil, and believe that this likely represents something approaching half of the ultimate potential of the Sverdrup Basin. But I think that even the most optimistic assessments and forecasts still place the Arctic Island's time well into the next century.

Now to address the Mackenzie Valley (Figure 5). This corridor of prospective sedimentary rocks north of the provincial border, stretching to the Beaufort and lying between the mountains to the West and the Shield to the East, is a bit of an enigma in terms of the hydrocarbons that have been discovered up to now.

The first and only oil discovery was made in Norman Wells in 1920. Subsequent drilling in the NWT and Yukon of over 600 exploration wells resulted in only a few gas discoveries near the B.C. border, and one at Tweed Lake, producing a very discouraging success rate. Nonetheless, modern seismic is much more definitive and new geologic ideas are currently being pursued. Oil development infrastructure is in place as far as Norman Wells with a 25,000 B/D capacity line which can be doubled with added power stations.

MACKENZIE VALLEY EXPLORATION
INDUSTRY

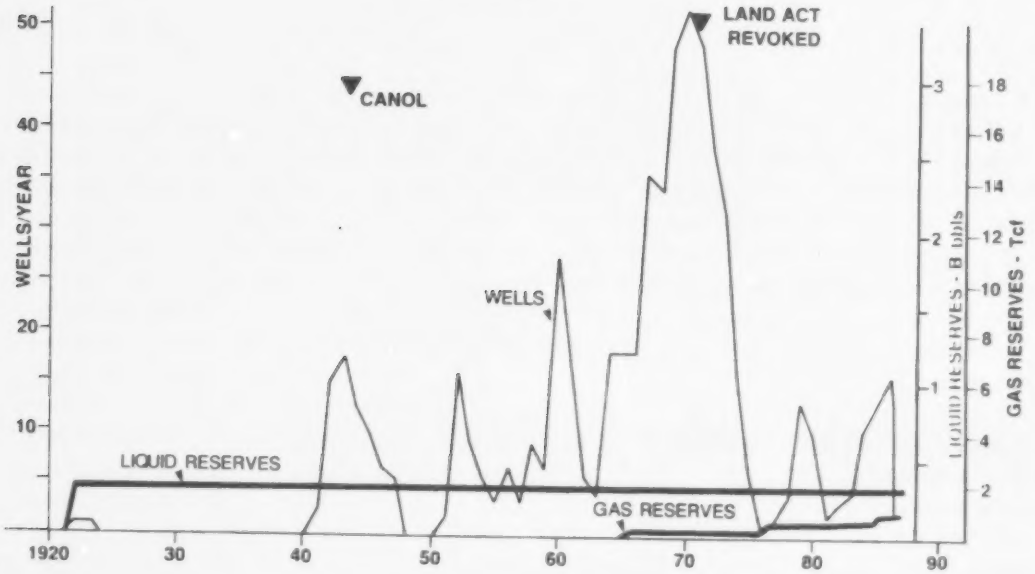

Figure 5

We see a very modest potential for the Mackenzie Valley area, but relatively small oil pools in the order of 5 million barrels could be tied in economically. There is probably a greater potential for gas than for oil but even that potential appears modest. Future gas discoveries are likely to be concentrated along the mountain front structures, and oil discoveries perhaps in Devonian reefs.

A key factor in realizing the potential of the NWT mainland will be the lifting of the moratorium on the issuance of new oil and gas exploration rights which has generally been in effect since 1970 (except for the one issuance that took place in the Fort Good Hope area about two years ago).

I have appreciated this opportunity to share with you some of my thoughts for the hydrocarbon potential of the North. As I mentioned earlier, my career in the oil and gas business has been closely aligned with the frontier areas, and I have personally experienced many of the exhilarating high points and the disappointing low points that have characterized the exploration history of our northern frontiers. I, like many of you here, await the day when that hydrocarbon potential is finally realized.

3.2 THE PETROLEUM RESOURCES OF NORTHERN CANADA[1]

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Geological Survey of Canada
Institute of Sedimentary and Petroleum Geology

Estimates of the quantities of oil and gas resources that may exist in the sedimentary basins of Canada are prepared periodically by the Geological Survey of Canada. These estimates are prepared systematically on a region-by-region basis using established computer-based probability methods. The process includes an examination of each of the exploration plays known or thought to exist in each basin, based on an examination of the geological history of the region. The estimates are an attempt to quantify all of the oil and gas that might exist regardless of whether or not it may ever be explored for and be discovered, or whether or not it can be economically exploited. The methodology used does, however, generate the type of data upon which others may subsequently base their economic analyses (Podruski et al., 1988, p. 7-13).

Estimates of the total quantities of oil and gas that may exist are referred to as estimates of regional resource endowment. This endowment usually consists of a discovered component (called reserves if known with a high level of confidence and economically exploitable), and an undiscovered component called potential. In the discussion that follows, the petroleum resource endowment of northern Canada is described in terms of those two components. An attempt is also made to show how regional resource endowment estimates can be used, using recently prepared estimates of oil and gas resources of the Mackenzie Delta - Beaufort Sea region as an example.

The petroleum resource endowment of northern Canada compares favourably with that of both western Canada and the eastcoast offshore regions, as shown in Figure 1. The numbers quoted are, of course, misleading in that most of the resources in western Canada will be found economic to exploit (in fact 54% of the oil and 19% of the gas have already been produced) whereas only a small component of the frontier resources may be exploitable because of high costs and logistical difficulties. In order to evaluate the importance of resources in northern Canada one must consider how they are distributed both geographically and in terms of sizes of accumulations. In Figure 2, the gas and oil resources are identified as very unequally distributed in northern Canada. The segment labelled "other" represents resources of northern Baffin Bay, Hudson Bay and the Mackenzie Corridor (Procter et al., 1984). Although parts of that resource in the Mackenzie Corridor will probably be of immediate interest, the remainder occurs in areas that will probably receive little attention over the next ten years due to their remote location. Geographically, the distribution of the regional resource endowment for gas is thought to be greatest in the Arctic Islands, but for oil, the Mackenzie Delta - Beaufort Sea is the largest. Both regions contain substantial resources with important discoveries and deserve separate comment.

[1]Contribution of the Geological Survey of Canada No. 44788

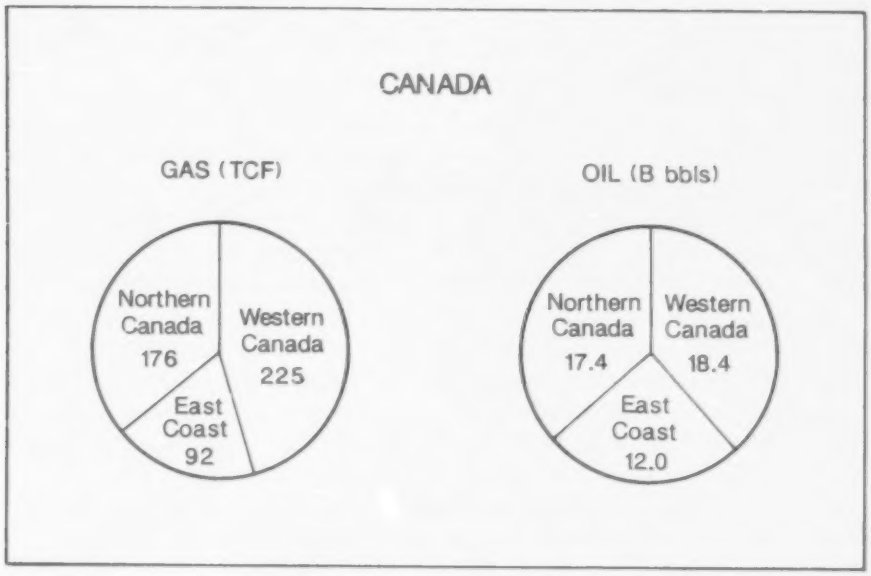

Figure 1
Oil and Gas Resources of Canada
Values given in figures 1,2,4 and 6 are the average expectations from frequency distributions of estimates.

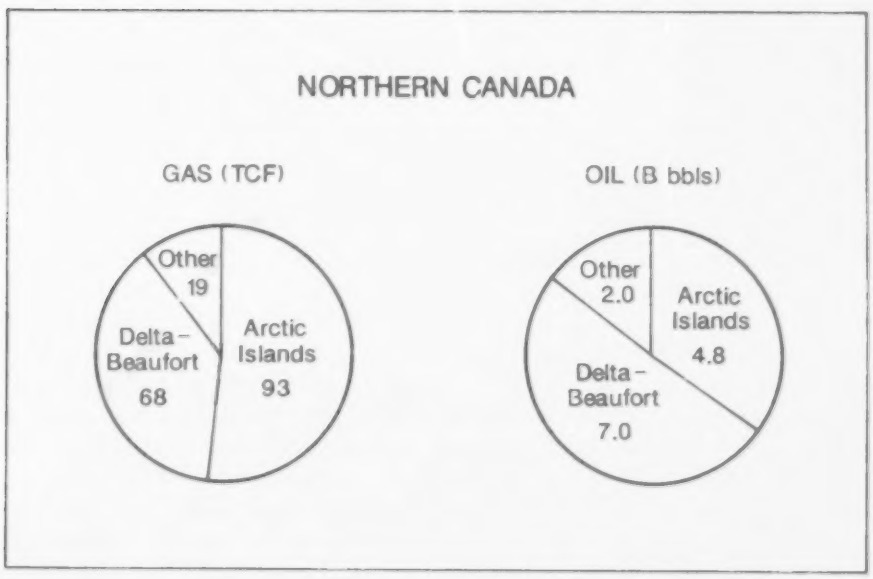

Figure 2
Oil and Gas Resources of Northern Canada

ARCTIC ISLANDS REGION

Fewer than 200 wells have been drilled in the region, of which about 90 were exploration or wildcat wells. This relatively sparse drilling has resulted in 15 significant gas and oil discoveries (Figure 3), including the giant Drake and Hecla gas fields. The total resource endowment for the region is estimated to be 93 TCF of gas and 4.8 billion barrels of oil (average expectation). As indicated in Figure 4, about 15 TCF of gas and about 500 million barrels of oil have been discovered, leaving significant undiscovered potential for both gas and oil. Although the major focus of exploration was to identify sufficient gas discoveries to support pipeline transportation, several oil discoveries were also made, including the major accumulation at Cisco of more than 200 million barrels of oil. Unfortunately, the remoteness of the area from markets, high operating and transportation costs due to the hostile environment, fiscal regimes, and the discovery of major oil and gas in both the eastcoast and Mackenzie Delta areas have resulted in making the Arctic Islands unattractive from an exploration viewpoint at this time. This situation will probably prevail through the nineties with the only significant activity being the "demonstration" production using small tankers from the small Bent Horn oil discovery on Cameron Island. No doubt the resources of this region will be important in the next century.

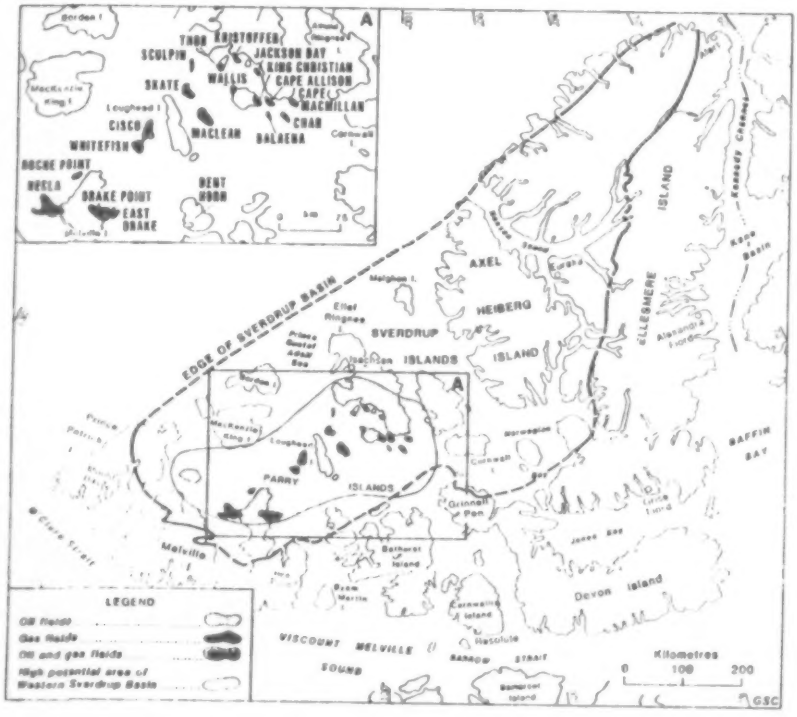

Figure 3
Map showing significant oil and gas discoveries
in the Arctic Islands Region (from Nassichuk, 1987).

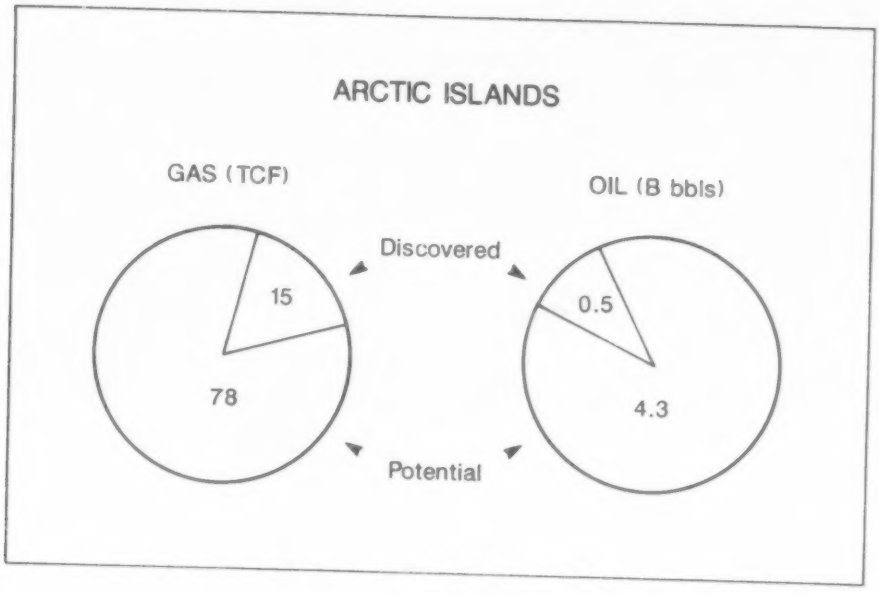

Figure 4
Oil and Gas Resources of the Arctic Islands Region

MACKENZIE DELTA - BEAUFORT SEA REGION

About 240 wells have been drilled in this region, leading to 49 significant gas and oil discoveries (Figure 5). The most significant discoveries include the giant Taglu gas field (about 3 TCF) and major gas at Parsons (both onshore), the giant oil field at Amauligak (about 500 million barrels), and a major accumulation at Adlartok. The first three discoveries are important because they have characteristics that may lead to early development (given appropriate world prices), and the Adlartok discovery is important because it is the first major find in a series of new and relatively untested plays in the western part of the Beaufort Sea.

The regional resource endowment for the Mackenzie Delta - Beaufort Sea region is estimated to be 68 TCF of gas and 7 billion barrels of oil (average expectation) in a recently completed study of the area (Dixon et al., 1988). As indicated in Figure 6, about 11.7 TCF of gas and 1.7 billion barrels of oil have already been discovered, and about 75 percent of the total endowment for the region is shown as undiscovered potential. Although the values shown in Figure 6 are the kinds of estimates that are commonly quoted in summary statements of resource endowment, they are generally too simplistic and may be misleading for planning purposes. In order to make better use of endowment estimates, one needs to know where the resources occur geographically (onshore or offshore, shallow or deep, near or distant) and some concept of the degree of dispersion of the resources (number and size-ranges of individual accumulations). This type of information allows one to consider which parts of the total resource may meet various criteria for future economic development by virtue of field size, proximity to production - transportation centres, projected exploration levels, or other such considerations.

Figure 5
Map showing significant oil and gas discoveries in the
Mackenzie Delta - Beaufort Sea Region (from Nassichuk, 1987).

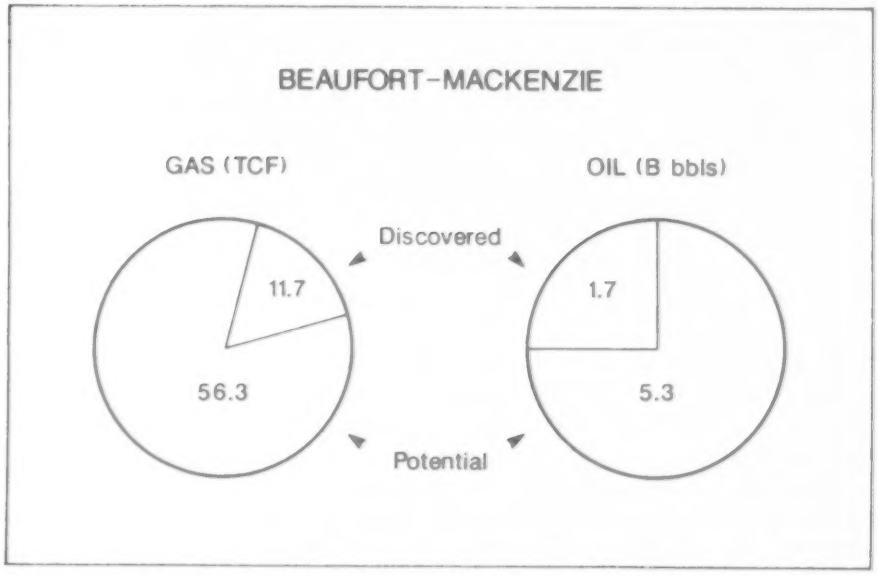

Figure 6
Oil and Gas Resources of the
Mackenzie Delta - Beaufort Sea Region

The recently completed analysis of petroleum resources of the Mackenzie Delta - Beaufort Sea was based on the critical examination of 20 exploration plays identified in the region (Dixon et al., 1988). The 20 plays occur in four groups, distinguished by geographic, geologic and developmental criteria. The Onshore and Shallow Offshore group comprises 8 plays that exist in the Richards Island, South Delta and Tuk Peninsula areas, plus their extensions into adjacent shallow water. The plays include Paleozoic, Mesozoic and Tertiary targets. The Offshore Delta group of four plays forms a narrow fairway in which several major oil and gas discoveries have been made extending from Tarsiut to Amauligak. This group occurs in about 25 metres of water, and exists in rocks of similar age and with similar structural style. The West Beaufort group of 3 plays differs significantly from the main delta plays in the structural style and trends of the area, the age of reservoirs and the oil generation regime. The Deep Water and Other group consists of 5 plays, dominated by two plays that occur in deeper water beyond the Offshore Delta and West Beaufort groups. These two Tertiary plays rely on deep water sedimentation for reservoir opportunities. The other three plays are combined with this group because they are truly conceptual and will probably not attract serious exploration for some time.

The quantities of gas and oil discovered and the remaining potential are tabulated in Figure 7. Although both categories of resource are estimated in a probability context and expressed as cumulative frequency distributions, the values shown in Figure 7 represent the arithmetic means ($\bar{x}$) or average expectations of the distributions. Highlights from the analysis of discovery and potential include:

MACKENZIE DELTA - BEAUFORT SEA RESOURCES

Play Group	Oil $\bar{x}$ (10^9 BBLS)		Gas $\bar{x}$ (TCF)	
	Reserves	Potential	Reserves	Potential
Onshore-Shallow Offshore	0.251	1.05	7.48	14.46
Offshore Delta	0.910	1.2	3.29	11.4
West Beaufort	0.226	1.9	0	12.5
Deep and Other	0.357	1.1	0.88	17.7

Figure 7
Tabulation of mean values of reserves (discovered resources) and potential for groups of plays.

Onshore-Shallow Offshore

About 20 percent of the oil resources estimated for this group has already been discovered. The 251 million barrels discovered exist in 14 fields, the bigger ones being Adgo, Kumak, Ivik North and Atkinson. About 1 billion barrels remain undiscovered, dispersed in about 150 pools. For gas, almost one third of the total endowment of 22 TCF has been discovered in 14 fields. These include the near-giant Taglu field, plus Parsons and Niglintgak each of which contain more than 500 Bcf gas. More than 14 TCF of gas remains undiscovered, distributed in more than 170 pools. Resources are expected to be dispersed in a large number of traps, compared to other play groups, but should still constitute very attractive onshore exploration prospects compared to remaining conventional western Canada basin targets, given that a production infrastructure is developed in the area.

Offshore Delta

The giant Amauligak oil discovery dominates this group of plays. More than 40 percent of the 2.1 billion barrels of oil estimated to exist in this play group has been discovered in 7 fields. Most of the oil discoveries have associated gas, which, along with about 120 predicted but undiscovered pools, amounts to substantial gas resources of almost 15 TCF. The success rate in this group of plays is about 50 percent, making this trend an outstanding area of opportunity by any standards. Remaining targets in this play are expected to include thick and highly productive pay zones in relatively simple but faulted structures.

West Beaufort

This is the least explored of the play groups, but is estimated to contain about the same total oil resources as the Offshore Delta group. The discovery of a major oil field at Adlartok has identified a whole new family of potential opportunities, including at least one giant-sized accumulation. This series of plays will be the "new frontier" within the region, containing numerous structures in somewhat deeper water (50-100 m) than those of the main Offshore Delta plays.

Deep Water and Other

Only one of the five plays in this group have been tested, resulting in several oil and gas discoveries. The Kopanoar oil and Kenalooak gas discoveries stand out as large but probably beyond economic development for the foreseeable future. The problem is one of thin, discontinuous pay zones in broad structures located in water depths greater than 100 metres. The two deep-water plays are expected to contain large resources estimated at mean expectations of 1.5 billion barrels of oil and almost 20 TCF of gas.

Discounting the Regional Resource Endowment

Consideration of the manner in which the total gas and oil endowment (68 TCF of gas and 7 billion barrels of oil) is distributed in the four play groups, along with the characteristics of the plays in each group, provides a simple basis for discounting the endowment. For example, if one wanted to focus only on resources that will likely be of interest through the nineties, the elements of the total endowment tabulated in Figure 7 that would probably qualify include gas

and oil plays of the Onshore-Shallow Offshore group, oil plays in the Offshore Delta group and possibly oil in the West Beaufort group. This selection is based on the likelihood that early development of gas reserves at Taglu would lead to exploration and delineation of other gas nearby in the onshore area; and that if the oil at Amauligak were to be developed, then other oil resources both in the offshore trend and onshore would have a good chance of development. Inclusion of oil plays in the West Beaufort is based on the probable desire to evaluate the area as soon as the "economic climate" permits. If one accepts these assumptions, then the part of the endowment of interest through the nineties would reduce to 14.5 TCF of gas, 7.5 TCF of which is already discovered; and 5.5 billion barrels of oil, 1.4 billion barrels of which has already been discovered. Using the information on individual pool sizes provided by Dixon et al., (1984), this endowment could be reduced or discounted even more by considering only that part of the endowment that occurs in pools larger than some size considered economically viable.

SUMMARY

Northern Canada is richly endowed with oil and gas resources, approximately equal to the conventional oil and gas resources of western Canada. The resource endowment of northern Canada, however, has to be severely discounted because of the remote location, high costs, environmental concerns and logistical difficulties associated with most of the resources. Throughout the nineties, the components of the endowment that will be of particular interest are likely to include oil and gas along the Mackenzie Corridor; oil and gas in the onshore and shallow offshore of the Mackenzie Delta; and oil resources in the offshore Delta trend. The West Beaufort oil opportunities are also likely to be the target of limited exploration. What part of the total resource endowment will be developed in the future will depend very much on future world prices - certainly northern Canada will remain one of the best areas in North America in which to explore for some time.

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CHAPTER 4

REGULATION

4.1

COGLA AND THE EVOLVING NORTHERN OIL AND GAS REGULATORY PROCESSES

Maurice E. Taschereau
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Canada Oil and Gas Lands Administration

INTRODUCTION

As I am sure you will recognize, the recent agreements on the principles for a Northern Accord between the Government of Canada and the Governments of the Northwest Territories and Yukon and the agreement-in-principle on the settlement of the Dene-Metis claim, have set the stage for significant changes to the current process of regulating oil and gas exploration and development activity in the North.

While the details and timing of the changes are still to be determined, their general direction is already apparent from these agreements. The oil and gas regulatory situation in the North in the 1990s will feature:

- joint federal-territorial management of the offshore;
- territorial management of the onshore;
- more aboriginal groups becoming the legal landlords of large areas of surface lands and smaller, sub-surface land areas, with obvious implications for rights management and access.

These are positive developments and in keeping with the federal government's 1985 Frontier Energy Policy and the Northern Political and Economic Framework announced by Mr. McKnight in August 1988. Two key elements in this framework are the devolution of responsibilities, including responsibility for managing non-renewable natural resources, to the territorial governments and the early settlement of land claims. The resolution of many of the uncertainties that have characterized the northern political and socio-economic scene in the past should lead to a more stable and certain operating environment for the petroleum industry and, hopefully, will result in renewed industry interest in the North.

COGLA'S EVOLVING ROLE

Clearly, there is change on the horizon. Change, of course, is not a new word to COGLA. Looking back over our brief history, it seems to me that one of the things that we as an organization have done best is to implement change, which has often been of a fundamental nature to us. Indeed, our formation in 1981 on the basis of a memorandum of understanding between the Ministers of EMR and DIAND implemented the federal government's decision to radically change the way that frontier oil and gas resources were managed. COGLA was directed to serve as a "single window" for industry in what was a highly centralized approach to oil and gas management and regulation.

Following a change of government in 1984, the Atlantic Accord was concluded and a new Frontier Energy Policy was announced. Our role on the eastcoast changed from offshore regulator to Accord implementor. We were directed to facilitate a decentralized approach founded on joint management of the offshore with the provinces. Once the work of finalizing the Atlantic Accord implementation legislation and establishing the Canada-Newfoundland Offshore Petroleum Board was completed, our role with respect to the Newfoundland offshore again changed. We became an advisor to the Minister of Energy, Mines and Resources on his responsibilities under the Canada-Newfoundland Atlantic Accord Implementation Act. Our role in Nova Scotia is following the same evolutionary path.

As you know, under the eastcoast Accord models, the new, independent boards have the final authority for technical decisions and the initial authority to make most other decisions. However, the federal and provincial energy ministers are ultimately and jointly responsible for the management of the offshore and retain the authority to direct or override a board on certain fundamental decisions. The Minister of EMR requires internal advice, as well as advice from the Board, with respect to the exercise of his responsibilities and authority. The Minister also requires advice with respect to any changes in the Accord legislation and supporting regulations. COGLA has advisory functions with respect to such matters. COGLA also has a key role, in cooperation with the Accord provinces and, more recently, the two territories, in the development of proposals for changes to legislation and regulations.

Over time, the federal role in regulating the frontiers is likely to take on more of a coordination dimension as more areas come under Accords. The federal government's objective will be to ensure that there continues to be consistency in the regulatory regimes in Canada's offshore areas. Please don't let the word "consistency" mislead you. There obviously will be regional variations that will reflect differences in regional circumstances, priorities and needs. When I speak of consistency, I am referring to the basic legislative framework for petroleum regulation in the offshore area and to those technical matters, such as safety and other standards, where uniform requirements across different geographic areas will benefit industry, governments and the public.

FACILITATING EARLY IMPLEMENTATION OF NORTHERN ACCORD AND LAND CLAIM AGREEMENTS

COGLA's role and modus operandi in the North have similarly evolved since 1981 and, with a Northern Accord and additional land claim settlements on the horizon, will undergo further change. We are already working in a consultative mode with the territorial governments and aboriginal groups and will continue to establish even closer working relationships as we move through the transition period towards the devolution of our management responsibilities.

I do not wish to speculate about the details or timing of a Northern Accord or the contents of the final agreements on the various aboriginal claims. These will become clear with time. I should like, instead, to provide you with a brief update on several initiatives that we are involved in which will facilitate early implementation of Northern Accord and land claim agreements.

Amendment of the Oil and Gas Production and Conservation Act

The principles established for the Northern Accord indicate that the current oil and gas legislative regime will continue in the offshore and form the basis for the initial management regime for the onshore. As you know, the current regime is governed by two federal acts: the Canada Petroleum Resources Act (CPRA) which is primarily concerned with rights management and the Oil and Gas Production and Conservation Act (OGPCA) which provides the basis for regulating exploration and development activities. The CPRA was proclaimed only in 1987 and does not require updating. The OGPCA, however, was originally enacted in 1969 and requires amendment to enhance the provisions relating to safety matters and, more generally, to remedy a number of technical deficiencies that have become apparent over the years.

We are currently working with the Accord provinces, the territorial governments, the Canada-Newfoundland Offshore Petroleum Board and the industry to finalize proposals for appropriate amendments. This complex exercise is providing opportunities for the territorial governments to deepen their understanding of the current legislative regime for oil and gas in the North and to further their appreciation of existing joint management arrangements. It goes without saying that territorial representatives are also receiving an early exposure to the complexities of intergovernment consultation in the oil and gas area.

Regulations

We are also working with the Accord provinces, the Canada-Newfoundland Offshore Petroleum Board, the territories and industry to develop various regulations under the CPRA and the OGPCA. These regulations will cover matters such as rights management, geophysical exploration, drilling, diving, production and conservation activities, to name but a few. We recognize that the territorial governments do not yet have the staff expertise to delve deeply into many of these matters and, generally have chosen to simply maintain a watching brief on the work underway or, on occasion, to provide comments based on the advice provided by knowledgeable consultants. In any case, early exposure of GNWT and YTG officials to these critical elements of any regulatory system is likely to facilitate the transition to the regime which will follow the Northern Accord.

Coordination with the Inuvialuit

Settlement of the Inuvialuit claim in 1984 marked an important point in the evolution of the oil and gas regulatory process in the western Arctic. The Inuvialuit, in effect, became the landlords for several operators and secured direct participation with the federal and territorial governments in environmental impact assessment.

The CPRA does not apply on the 7.1(a) lands because the Inuvialuit have title to the sub-surface as well as the surface. Naturally, existing rights holders were protected by grandfathering provisions in the Inuvialuit Final Agreement. They had the choice of either continuing their exploration agreement through to the end of its term or negotiating a concession agreement with the Inuvialuit prior to that time. Esso Resources Canada Limited, as you may know, chose the latter course and I understand the results were very positive for both parties.

COGLA, as well as industry, has had to adjust to the provisions of the Final Agreement and to adapt our practices and procedures accordingly. We have done this in full consultation with the Inuvialuit. For example, we changed our approvals process to ensure that geophysical surveys and drilling programs are not approved prior to receipt of the recommendations of the Environmental Impact Screening Committee. We also have reminded all operators of the need to contact the Joint Secretariat in Inuvik to discuss screening procedures early in the preparation of their application for COGLA approvals.

The Oil and Gas Production and Conservation Act is a law of general application and continues to apply throughout the Inuvialuit settlement region, including the 7.1(a) lands. In 1987, we briefed the Environmental Impact Screening Committee on the full range of approvals and authorizations that we issue under the OGPCA and discussed with committee members their proposed Operating Guidelines and Procedures to ensure the necessary degree of compatibility between our respective review processes. Generally, our work with the Inuvialuit has given us a better understanding of some of the activities that are involved in the implementation of a land claim settlement. Our experience should help to facilitate the implementation of other land claims agreements.

CHALLENGES HEADING INTO THE 1990s

As I have noted, resource management structures are evolving in the North and will continue to do so in response to further progress in finalizing and implementing aboriginal claims settlements and Accord arrangements. Regulatory processes will evolve in parallel in recognition that there is a new way of doing business in the North, one which must fully respect the aspirations and interests of those who will be most affected by oil and gas development. The agreements-in-principle between the Government of Canada and the Governments of the Yukon and the Northwest Territories, for example, call for immediate consultation with the territorial governments on all significant decisions affecting oil and gas.

One of the critical challenges facing governments, aboriginal claimant groups and industry over the near term will be to work together during the transition from the existing oil and gas management and regulatory processes to the new ones which will be created upon full implementation of claim settlements and Accord arrangements.

The potential contribution of oil and gas development to the northern economy over time is significant. However, one must be realistic when assessing this potential, particularly in the near term. Expectations must be tempered by the economic realities, risks and uncertainties associated with major frontier projects. One need only look to the roller coaster history of the Hibernia project for evidence of how quickly development prospects can change in the face of oil price swings and other economic factors.

Yes, past experience has taught us that the window of opportunity to develop a major frontier oil and gas project can be a fleeting one. Companies are faced with significant commercial risks such as oil price volatility, inflation and the application of new technology, to name but a few. Decisions to proceed are difficult enough in this environment without adding to it the risk of potential delays or uncertainties in government review and approval processes. If there is an imperative, with respect to frontier production, it is that we must get out ahead to the extent possible in laying the groundwork for a project to proceed so that, when the time is appropriate, it will proceed.

Thus, we will be doubly challenged as we head into the 1990s: on the one hand, to work together in developing and implementing new management and regulatory processes in the North, while on the other hand, to move forward projects which will contribute to the economic well-being of all Canadians.

You are undoubtedly aware of the recent Hibernia agreement-in-principle signed by the Government of Canada and the Government of Newfoundland and Labrador with Mobil and partners. I would like to digress for a moment from the main focus of this session to say just a few words about what this agreement-in-principle means for Canada and for other major, frontier oil and gas projects.

In providing substantial assistance to the Hibernia project, the Government of Canada had more than one economic motivation. The project, of course, will generate a large number of jobs. However, what makes this project worthy of the federal support it will receive is its pivotal role in "kick-starting" a new oil producing region and in providing the opportunity for Canadians, particularly Newfoundlanders, to develop significant expertise in the technology and management of major offshore development projects. The development of this expertise for use in future projects, in Canada and abroad, will be one of the major benefits accruing to the nation from the Hibernia project.

Technology transfer is of fundamental importance to Canada. The federal government will want to ensure that every effort is made to meet the targets agreed to for Canadian and Newfoundland content on the project, and if possible, to exceed the commitments by a healthy margin. The consortia, which are being put together to bid on the major Hibernia project contracts, will be scrutinized so that the federal government can be assured that they are genuine vehicles for the transfer of foreign technology to Canadian firms competent to retain and make further use of such technology.

What bearing does the Hibernia project have on the North, you may be asking yourselves? There are, to me, important signals in the Hibernia experience for future frontier megaprojects in the North and elsewhere in Canada. There is no question in my mind that the Atlantic Accord and the underlying philosophy of a full and equal partnership of governments which it espouses, made the project possible. Industry too, must be credited for working closely and cooperatively with governments to achieve the agreement-in-principle. Without this cooperative approach, Hibernia might still be a distant star on the horizon.

The agreement-in-principle was also made possible by the certainty that existed with regard to the legislative regime and management structure for offshore oil and gas and, in particular, by the advanced state of the regulatory review of the development and benefits plans for the project.

Hibernia was not achieved without a lot of cooperation and advance work. If this same prescription is applied in the North, I believe that it will not be too long before the North sees its own "Hibernia". I look forward to being part of the process that will help to bring this about.

QUESTIONS/DISCUSSION

Michael Jarvis: You referred earlier, to the Canada Petroleum Resources Act not applying to certain of the Inuvialuit lands. That point was made on Friday at Yellowknife when one of the spokesmen for the Inuvialuit made that quite clear and he had in mind bringing in their own legislation. If that's the case, under whose authority would the legislation be brought in and, who, in fact, would apply it? How do you see that aspect of the area frontier being regulated as far as the provisions of the CPRA?

Maurice Taschereau: I believe the CPRA does not apply only on 7.1(a) lands, that is the lands where the Inuvialuit own the resources which are underneath. The laws that would apply, are the laws that anybody that owns their own rights, can keep them or can sell them to somebody else. So it's just a law of making a deal, a contract between the Inuvialuit and those that want to go in and explore. Esso already had some of those lands and they made such a deal. You have an agreement with them for lands that are not already covered under this 7.1(a), the Inuvialuit can make a deal with anybody, the same as you would if you were going to sell your house. The OGPCA applies in the technical considerations. Companies that are working there must meet all the requirements as far as drilling the holes, as far as having blow-out preventers, as far as environmental considerations and so on. That still applies. We still have to apply that act. But the rights part of that is strictly between the Inuvialuit and the company that wants to do business there. The rest of the lands fall under CPRA and they have to go through the bidding requirements of the CPRA.

Vern Millard: Could you comment on whether there is overlap at all in terms of environmental issues on the offshore eastcoast; I'm thinking in terms of the Hibernia development. Were environmental issues handled strictly by the Newfoundland Board or was it by the provinces or federal government?

Maurice Taschereau: On Hibernia itself, of course, we had an Environmental Assessment and Review Process (EARP) and held hearings and so on, which were pre formation of the Board. Under existing legislation, I believe the Board can carry out its own hearings if it desires or it can task the EARP process to do it for them. Here, again, I think you get into the same little complication, the Newfoundland government, of course, doesn't necessarily recognize EARP as their process for looking at environmental considerations; they have their own. So, I think what would happen in the future is that the Board would set up a hearing, probably process some of the EARP people, (the secretariat, for instance, of EARP), who knows how to run one of these shows, so they could be contracted to help the Board carry out the process. I think this is what would happen. But, in Newfoundland, the Board has the final say. If the Board decides a hearing is not required, I'm not sure if this isn't one of the fundamental decisions that they could be overruled on and both governments could order them to hold a hearing. The Board has the right to hold a hearing itself while EARP does not.

4.2

THE NATIONAL ENERGY BOARD'S ROLE IN NORTHERN PIPELINE DEVELOPMENT

Roland Priddle
Chairman
National Energy Board

My talk focusses on the National Energy Board, and its relevance to hydrocarbon development in the North. First, I will describe the Board's mandate and how it is discharged in southern Canada. Then, I will briefly review the IPL (Norman Wells) experience with special reference to the associated environmental aspects. Finally, with that background established, I would like to look at how the Board's future role may evolve with hydrocarbon development in the North.

We are well aware that the North of 1988 is the North which has seen a land claim settlement with the Inuvialuit and an agreement-in-principle with the Dene-Metis. It is a North that is gaining the status of provincial-type resource ownership and management powers with the agreement-in-principle on a Northern Accord. It is a North that is becoming a full partner in the Canadian federation, and I wish to take this opportunity to congratulate all Northerners on that achievement.

While the Board has its particular mandate, it has in practice much flexibility to adapt to northern requirements.

PART I

Mandate of the National Energy Board

The National Energy Board has two main responsibilities: regulatory and advisory. It regulates the transmission facilities for certain forms of energy across provincial and international boundaries and the export of those energies. It keeps under review and advises the Minister of Energy, Mines and Resources on energy matters.

While some of its responsibilities are administrative in nature, much of the Board's work requires that it exercise its powers and duties in a quasi-judicial manner. Consideration of matters of major public interest often calls for public hearings.

The Review of Pipeline Applications

Among its duties, the Board authorizes the construction and is responsible for the safe operation of any hydrocarbon pipeline which crosses a provincial or international border or which makes landfall from the offshore area of Canada.

In dealing with applications to build any such pipeline, the Board performs its own technical, environmental and economic analyses based on the evidence provided to it and, in the case of major projects, conducts public hearings to examine all relevant matters to ensure that the pipeline is in the Canadian public interest. Now, a more detailed look at the various stages of that process.

Pre-Application Stage

The Board encourages companies to carry out discussions with government departments, provincial and territorial as well as federal, aboriginal claimant groups, communities and concerned citizens early in the project-planning process. In that way, local and regional concerns can be identified, and addressed in the application. Indeed, it is hoped that as many as possible understandings are achieved between the company and interested parties before the application is submitted to the Board. The importance of a thorough approach by companies in the pre-application stage can hardly be overemphasized.

Board staff regularly participate in pre-application meetings with companies and other interested parties to discuss the Board's information requirements, timing scenarios, and procedural matters.

Project Application Review

Once an application has been submitted, the Board's formal review begins. In the formal review, informal and bilateral contacts with the applicant cease, and are replaced by an on-the-record formal relationship involving all interested parties to ensure that the Board's decisions are based solely upon the open, public record.

The review includes a two-stage route approval process: the first stage is the "certification" of the project which includes among other things the general routing; the second stage, if required, is the site-specific determination of the "detailed route".

First Stage: Certification

During the first stage, the application is examined to ensure that all the necessary information, as specified in the Board's rules of practice and procedure, has been provided.

Once the Board is satisfied that the application is complete, dates for the public hearing are selected. A notice of the hearing will be published in local and nationally distributed newspapers and would include the procedures to be used at the hearing. In addition, interested parties identified by the Board at that time also would receive copies of the Hearing Order setting out the Board's procedures. Any party wishing to intervene at the hearing must file a written intervention with the Board. Registered intervenors then would be provided with a copy of the application and all other project information.

The Board may convene pre-hearing conferences to clarify the issues and sort out procedural matters.

The Board is responsible for assessing and reviewing all aspects of pipeline projects under its jurisdiction, which include technical matters such as engineering design, energy supply, markets, and environmental and socio-economic matters in order to satisfy itself that the pipeline is in the public convenience and necessity. In the assessment of environmental matters, the application will include an environmental issues list which identifies all the particular environmental concerns which may result from the construction and operation of the project.

Provincial governments through whose provinces interprovincial and international pipelines pass routinely participate in all phases of the Board's regulatory process to ensure that their concerns are dealt with. For instance, in Ontario, the province utilizes a pipeline coordinating committee of its various ministries to focus its particular concerns and have them brought into the Board review. Those concerns are addressed to the Board prior to the application being submitted, and, if necessary, through the formal intervention at the public hearing. That participation has developed into a workable procedure with a minimum amount of duplication, which ensures that provincial government concerns are addressed.

The Board's public hearing process also provides an effective form for the public, special interest groups, and all other parties to question an applicant and other interested parties and to express their views on the project directly to the decision-making body.

The Certificate

Upon completion of its review of the application, the Board will publish its decision and reasons, and, if the project is approved, prepare to issue a certificate. The issuance of certificates for major projects is subject to the approval of the Governor in Council; that is, the Cabinet has the power to either accept or reject the Board's recommendation that the certificate be issued, but does not have the power to vary it. Applications which are denied by the Board do not go to the Governor in Council for consideration.

The certificate may contain a wide range of terms and conditions of approval to allow for project control; however, it is not until the second stage of the overall procedure that the detailed route is fixed. Once issued, the certificate is the authorization for the project and identifies a general route.

Second Stage: Detailed Route Review

After receiving a certificate from the Board, a company must identify the lands to be acquired, and the owners and occupants of the lands involved, to begin the review of the detailed route; I am speaking now of a new pipeline, requiring a new right-of-way, not the addition of a line of pipe in the existing right-of-way.

The company is required to serve a notice on all owners of land proposed to be acquired. Landowners who feel their lands may be adversely affected by the project have an opportunity to comment on the detailed route.

If the Board receives a statement opposing the proposed detailed route, except for statements raising concerns about monetary compensation, it will hold a local public hearing. The local public hearing provides concerned landowners and affected parties an opportunity to speak directly to the Board with regard to the determination of the final route.

In that instance, the Board has the authority to allow reasonable costs incurred by a person in making representations at such a hearing. Those costs are payable to that person by the pipeline company. By contrast, intervenor costs incurred in the certificate stage are not included within the NEB Act, although I would anticipate other programs would be available to cover such costs.

Once the Board has heard all landowner objections, and is satisfied that the best possible detailed route has been selected, the Plans, Profiles and Book of Reference, previously filed by the company, can then be approved.

Compensation for Lands and Damages

For those parcels of land which have not been acquired, the company would continue to negotiate with the landowners. If either the landowner or the company is not satisfied with the compensation being offered, they can request the assistance of a negotiator or arbitration committee.

Although the procedures for negotiation and arbitration are contained within the NEB Act, those procedures are not within the authority of the NEB to initiate or implement.

If the parties cannot agree on the compensation payable for the acquisition of lands, or for damages resulting from the company's operations, the company or the landowner can apply to the Minister of Energy, Mines and Resources to request either negotiation or arbitration proceedings.

Right of Entry

In instances where land acquisition proceedings become prolonged or reach an impasse, the company can apply to the Board for a right of entry order. The landowner is advised and can contact the Board, stating any objections or concerns. The Board will judge the merits of the application and consider conditions with respect to scheduling and construction restrictions. If approved, that right of entry grants the company a right to enter upon the lands subject to any conditions specified in the order. That, of course, is only an action of last resort. The Act requires as well that immediate compensation payments be made to the landowner.

That completes our look at the project review and approval process. Next, I will speak briefly about the Board's role during construction.

Regulatory Control during Construction

Prior to the beginning of construction, all pre-construction conditions of the certificate, including the environmental conditions, must be satisfied.

An important element of a company's environmental protection program is the environmental issues list. Prior to the start of construction, the Board requires the company to create a list of significant environmental issues. That list is maintained through the life of a project and serves as the primary means to ensure that all mitigative and restorative actions necessary to protect the environment are carried out. The list is continually updated as new concerns arise or former ones are resolved. Ultimately, all issues identified during the course of the project must be resolved to the Board's satisfaction.

During construction, the pipeline company must have full-time inspectors on site to oversee the activities of their contractors, and to ensure that the requirements with respect to pipeline construction and environmental protection are fulfilled. The Board maintains a presence,

through its own field inspectors, to ensure that the company effectively carries out all commitments given, implements all appropriate procedures, complies with the Board's regulations, and observes all safety practices.

Provincial or other government agencies may have specific issues that they wish to see resolved on the right-of-way. In that case, inspectors of those agencies often oversee their particular concerns; however, they address the resolution of those issues to the company by way of the Board. In that way, the provincial concerns are addressed, and the company is regulated through one window only. In other words, the NEB provides a vehicle through which all interests can be addressed.

Post-construction Monitoring

Once construction has been complete, and the Board has authorized the start of operations of the facility, the company is required to submit a post-construction environmental report. That report describes the status of environmental issues identified at the application stage and during construction.

The Board also requires a company to monitor the right-of-way for several years after construction has been completed to ensure that disturbed areas are properly restored.

During the operation of the pipeline, a company is required to maintain manuals and procedures that set out monitoring and surveillance programs and emergency response procedures for the protection of public safety and the environment.

At regular intervals, the Board inspects the rights-of-way of operating pipelines to ensure that the company is following all safety procedures and that the rights-of-way are properly maintained. That sets out briefly the NEB process in southern Canada.

PART II

The Interprovincial Pipe Line (Norman Wells) Project as an Example

I will now turn to the IPL (NW) project as an example of how the NEB process applies in a northern setting.

We have had some experience with pipelines in the North, and Northerners have been exposed to the Board's regulatory process. The Board's first main involvement in the North came with the Northern Natural Gas Pipeline Hearings in the mid-70s. That brought the Board's hearing process to Inuvik, Yellowknife and Whitehorse. It was the IPL (NW) project, however, that provided the Board with the opportunity to get on-the-ground northern experience and learn some valuable lessons about how to adjust our procedures to meet northern requirements.

Application and Hearings Phases

In March of 1980, Interprovincial Pipe Line (NW) Ltd. filed an application with the National Energy Board for a certificate to construct an oil pipeline from Norman Wells, NWT to Zama, Alberta.

Following 21 days of hearings during October and November at locations including Yellowknife, to review the application, the Board approved the project, in March 1981, subject to certain terms and conditions which included additional detailed investigations to finalize the project plans.

Following the review and approval of the additional studies the company produced its Environment Protection Plan (EPP) which drew into a single document sound construction techniques together with good environmental practices to be used on the project. The EPP formed the focal point for all subsequent construction and environmental protection practices and activities.

The Board reinforced IPL (NW)'s environmental commitments by directing the company to include the approved EPP as part of the construction contracts on which the pipeline contractors would bid. A similar approach was used with respect to the socio-economic action plan which also formed part of the contract documents.

Construction Phase

A major concern associated with the Norman Wells pipeline was that it was built in an area where thaw-sensitive terrain was known to occur. The design of the pipeline, therefore, had to ensure the long-term safety of the pipeline, and include measures to prevent erosion and slumping.

The pipeline was constructed through lands for which the government was still negotiating native claims, and the potential socio-economic impacts of the project were of major concern. The pipeline had to be built with due consideration given to the northern aspirations for business contracts and jobs, and to the potential deleterious effects that the project could have on the native way of life.

Throughout the construction period, the Board had engineering and environmental inspectors at the job site to ensure that all commitments and undertakings of the company were not only implemented, but were effective in meeting their stated objectives. I must emphasize the excellent working relationship that developed with Department of Indian and Northern Affairs (DINA) and Government of the Northwest Territories (GNWT) staff in the field. Their cooperation and expertise was of great assistance to the Board.

Following construction, the Board required IPL (NW) to submit detailed technical, environmental and socio-economic monitoring reports annually for two years. Since that time, the company has continued to report to the Board on the success of its restoration program.

The Board's staff continues to audit company performance in the field regularly, confirming the company's reportings and studying the progress of restoration at specific locations. Those monitoring activities will continue throughout the operational life of the pipeline.

PART III

Potential Future Changes in the Board's Role

In retrospect, there are a number of improvements to the regulatory process which the Board could implement in a future pipeline project. To increase the general understanding of the Board's role in regulating a pipeline project, I and some of my senior staff have been visiting northern governments, agencies, and leaders. We have gained increased insight into the concerns of Northerners and their particular needs, which should prove useful when other pipeline reviews are undertaken. At the same time, we have also explained the Board's review process and project controls for pipeline projects. We do not claim that the mutual understanding is complete, but we have every intention of continuing and broadening that liaison from all levels at the Board.

During the public hearing phase of the IPL (NW) review, portions of the hearing were held in northern communities. For any future project, the Board will give particular consideration to, and seek to accommodate, requests from Northerners with respect to the timing and location of the hearing.

To assist in creating a useful interface between the Board and local groups, the Board will be considering the establishment of a local office in the North during the period covering the application review and throughout any subsequent construction. That office would be staffed by NEB personnel who could provide advice and information to anyone with a concern related to proposed pipeline projects.

Future Northern Pipeline Reviews

With respect to possible applications for pipelines in the North, we have on file with the Board the Dempster Gas Pipeline application, which would bring Mackenzie Delta gas to Whitehorse. Also, Polar Gas has had an application filed with the Board since 1984; however, that company requires gas marketing information to complete their application.

We have had preliminary discussions with officials from a number of developers who foresee a market for additional northern oil and for gas in the second half of the 90s. Indeed, Esso and Shell have now filed with the Board their applications for licences to cover the export of Mackenzie Delta gas.

Northerners have made us aware that there are unique aspects to northern hydrocarbon development. Northern institutions reflect special people, culture, and environments. We will respect northern realities, and seek to work within them.

"South of 60" the Board regulates more than forty pipelines that cross provincial boundaries. Over the years a clear working relationship has been established with respect to provincial governments concerning federally regulated pipelines.

In the North, the GNWT and the NEB have had only limited opportunities for interaction, primarily through the Norman Wells project. At that time, the major interaction was with DINA; however, with the devolution of responsibilities to the GNWT, we can assume that greater responsibilities will be exercised by the northern government.

The details of the processes that are used in regulating pipelines in the South may need to be modified to respond to the unique northern context. We feel confident, however, that any problems which arise can be resolved, and a similar cooperative relationship can be created.

Native Land Claims

The large-scale commercial development of the oil resources of the Mackenzie/Beaufort area would likely involve a transmission pipeline running up the Mackenzie Valley and continuing southward into Alberta. The responsibilities for acquiring the necessary land rights for a pipeline route rests with the company through negotiation with individual landowners and agreements with native peoples as may be required by the terms of their land claim settlements. In Alberta, where private and Crown lands are involved, the review and approval of the route will be similar to the process I outlined earlier, whereas for routing across lands in the territories, involving virtually no private lands, a modified process may be required.

As you are aware, under the Inuvialuit Final Agreement, Inuvialuit lands are distinguished from other private lands in that the ownership and administration of those lands is implemented by specific statute.

As part of the Inuvialuit route approval procedure for Inuvialuit lands, the proponent will be required to submit an initial project description for evaluation by the joint government/ Inuvialuit Environmental Impact Screening Committee. That Committee will determine whether a detailed environmental assessment is required and whom they wish to conduct that assessment. It may be that the Inuvialuit will wish to refer the pipeline project for public review to the joint government/Inuvialuit Review Board. Another option, however, would be for Inuvialuit Environmental Impact Screening Committee to recommend that the NEB hearing process be used to assess the environmental impacts and determine the measures needed to protect the environment. We believe that, if the latter approach were followed, the Inuvialuit's requirements could certainly be met effectively. The Board's process extends from the environmental concerns and conditions to the basic engineering and geotechnical procedures through to the Environmental Protection Plan. Regardless of the option chosen, it is reasonable to assume that there would be no need for a detailed-route hearing by the Board to be held for access involving Inuvialuit lands.

For other native peoples' groups, such as the Dene-Metis, the Tungavik Federation of Nunavut and the Council of Yukon Indians, no final agreement has yet been reached with the Government of Canada. Ratification of an agreement-in-principle by the Dene-Metis and the federal government has recently taken place. It may be premature to discuss routing requirements for that portion of the Mackenzie Valley as land selection has not yet started, and a final agreement has not yet been reached.

Nevertheless, two important features of the proposed Dene-Metis agreement should be mentioned. First, unlike the Inuvialuit Final Agreement, participation agreements with the company would not necessarily be a mandatory requirement in routing negotiations. If both parties are agreeable, the company could negotiate directly with the Dene-Metis for the land access they require.

Should land acquisition negotiations with the Dene-Metis not be successful, the Board's detailed-route process could be utilized. A clause was included in the Dene-Metis agreement-in-principle to allow for the Board's right-of-entry process which obviously would involve a detailed-route hearing. Hopefully, that hearing process would resolve the problem. Furthermore, any right-of-entry order that the Board might recommend would still require the approval of Governor in Council.

With respect to the arbitration of land costs, the Dene-Metis proposal makes use of the arbitration procedures in the NEB Act. In that case, at least one member of the Committee is to be a Dene-Metis nominee.

Interaction with Other Federal Departments

In addition to the Board, other federal departments and agencies have jurisdiction over certain aspects of northern development. For example, I expect there will be offshore and onshore components to any eventual project proposals. Under existing legislation, approvals for offshore development and offshore pipelines associated with the transmission of production from such development would require approvals from the Canada Oil and Gas Lands Administration. There is potential at the federal level for duplication and overlap in the review of that aspect of a northern pipeline project. The final design of the facilities will affect how the total project will be regulated.

This legislative overlap should be eliminated before applicants have to prepare their filings. This could be done by legislative amendment or by administrative decision of the federal minister or ministers involved. The latter approach was taken in the case of the Venture Gas project on the eastcoast.

FEARO and NEB Environmental Reviews

The environmental review of northern pipeline projects could be both complex and extensive, and in addition to the northern environmental reviews could involve more than one federal review agency.

In the review of environmental impacts for northern pipelines, for example, there has always existed a potential for an overlap in public hearing reviews at the federal level between the NEB and the Environmental Assessment and Review Process (EARP). I have been involved in many meetings with the intention of finding a means to streamline those review and regulatory processes, and I am glad to report that there has been progress. In response to the Cabinet's instruction to put forward proposals to reform the EARP, the Federal Environmental Assessment Review Office (FEARO) has been working cooperatively with the NEB to determine ways and means of avoiding unnecessary duplication of hearings.

Two alternative approaches have evolved from those discussions. In the first instance, the initiating department, DINA in this case, knowing that the project will have major environmental impacts, could go directly to a public review process. While that process could mean either the EARP or the NEB, if the initiating department were to request that the NEB process be used, then that process, modified as I will explain in a moment, could then be the only environmental review and public hearing process necessary for the project.

As a second alternative, the initiating department could screen the project and determine that an Initial Environmental Evaluation (IEE) should be carried out. That IEE would be subject to informal public consultation leading to a decision by the initiating department and FEARO as to how the environmental review should proceed from there, including the possibility of an environmental assessment panel review.

If the result of the IEE process indicated that a panel review was desirable, then FEARO could recommend that the review for EARP purposes be that which is carried out by the NEB. In that case, the federal Ministers of Environment and Energy, Mines and Resources would recommend a temporary member be appointed to the NEB Hearing Panel. Such a member would, of course, also be appointed where the decision is to go directly to a public review and where environmental impacts are expected to be significant. That member would have a recognized expertise in northern environmental matters, and would provide an additional depth of environmental knowledge to the NEB review panel.

In either instance, with the cooperative attitude shown, the potential for duplicate public hearings on environmental impacts would be virtually eliminated. The only remaining risk of duplication would be found in a situation where an EARP panel would be asked to review a group of interrelated developments or concepts, some part of which might require NEB review. Even in that case, careful writing of terms of reference could keep duplication to a minimum.

I should sound a note of caution. The Cabinet has not yet approved this proposal for NEB/FEARO cooperation and it is not possible to implement it without replacing or amending the present EARP Order-in-Council.

It is hoped that by similar cooperative means, other areas of overlapping jurisdiction can be reduced.

CONCLUSION

In conclusion, the message I would like to leave with you today is that although the issues associated with northern hydrocarbon development are complex and challenging, the Board is ready to meet that challenge. The Board will continue to work cooperatively with industry, other government departments, and Northerners to ensure that any future northern development is carried out without undue regulatory burden while at the same time properly recognizing the aspirations of Northerners and appropriately protecting the northern environment.

QUESTIONS/DISCUSSION

Pat Duffy: The proposal you've just raised in your paper, opening an opportunity for ministerial appointment of an environmental specialist to an NEB Board to look at a northern pipeline is not only very interesting, it probably holds out a lot of promise to head off the sort of duplication that many of us were involved in on the Norman Wells project. But there's another aspect of this that I'd like to ask you about. The history of the Norman Wells project hearings was such that the EARP panel went to a number of valley communities, Fort Simpson, Hay River, Ridley, Fort Good Hope to hear submissions from band councils and individuals

with respect to the pipeline proposal. By an arrangement which I think I could best describe as informal, NEB staff members attended many of these meetings and had the benefit of hearing about concerns and possible solutions. I'd like to know whether you feel that the NEB being rather more quasi-judicial, would have any difficulty in extending its hearings if necessary, to the community level beyond that of larger communities.

Roland Priddle: In retrospect, I think that the Board members who were involved, probably felt that they didn't do enough by way of regional sittings of the Board. I think a balance needs to be struck here. My feeling from talking with Board members in the Norman Wells experience and generally as we discussed northern pipelines and hearings associated with them, is that we ought to do more rather than less of that. How much more we sensibly could do, I'm not sure.

Our hearings are formal and people tell me that it may put off interested parties, particularly individuals or band council leaders from taking part at all or as vigorously as they might like to. Informality would encourage people to come forward and give the Board a sense and a flavour of local feeling; on the other hand, it's been the Board's long experience in all kinds of circumstances that tested evidence is highly desirable. I'm not going to say it's the best; evidence that is simply obtained without the opportunity for cross examination may be as valuable. So again, the Board will have to deal with that issue as it comes up. There is, of course, no reason why it should not. The Board isn't bound by law only to accept tested evidence that's been subject to cross examination; it can listen to people in camera or without cross examination and it could well be that it will have to adopt a number of strategies in getting evidence and getting the feel for local situations.

CHAPTER 5

SCIENCE, TECHNOLOGY AND THE ENVIRONMENT

5.1

TERRAIN AND PERMAFROST: THEIR INFLUENCE ON NORTHERN CONSTRUCTION

Owen L. Hughes
Geological Survey of Canada

Extensive exploitation in the permafrost regions of North America began with the discovery of gold in Alaska and Yukon in the 1890s, beginning a century of development of increasingly sophisticated approaches to construction on permafrost.

Hundreds of commercial and residential buildings were thrown up in places like Dawson, Yukon, following discovery of gold in the creeks of the Klondike district. In Dawson, construction proceeded without regard for, and probably in ignorance of, the ice-rich alluvial silts that underlie the flood plain on which Dawson was built. Inevitably, the ice-rich permafrost began to thaw, and settlement of the buildings ensued.

The pioneer response was simply to employ jacks, blocking and wedges periodically in order to keep buildings more or less level. When buildings were abandoned, settlement might continue to the stage where they were no longer habitable (Figure 1).

Figure 1
A house showing severe settlement due to permafrost degradation, Dawson, Y.T.

When degradation of permafrost turned roads into impassable quagmire, logs were used to build "corduroy" roads, a solution still used for primitive roads in northern North America. Along with simple solutions to problems arising from degradation of permafrost came the recognition that some surfaces were what we would call thaw-stable. In the unglaciated Klondike Plateau, the miners soon learned to build their roads along interconnected ridges,

where thaw-stable bedrock detritus forms a thin veneer over bedrock, rather than on ice-rich alluvial sediments of the valley floors. The Top-of-the-World Highway between Dawson City and Tetlin Junction in Alaska, is the modern successor to those pioneer roads.

Techniques such as steam thawing to prepare gold-bearing gravel for mining were developed early, but techniques for retaining permafrost in order to retain the high bearing strength of frozen soils were slower in coming. The simplest of such techniques are the use of insulating gravel pads to retain permafrost under light structures and highways, and the use of frozen-in-place piles to support larger structures, and these have been widely used only in the last two or three decades. More sophisticated approaches include proposed operation of gas pipelines in a chilled mode in order to prevent thawing.

The modern approach to construction in permafrost areas combines the selection of the best available building site or routing and employment of appropriate construction techniques for the terrain conditions encountered. The geologic origin of a particular terrain type plays a major part in determining its character, including permafrost and ground ice conditions. The characteristic landforms and vegetation associated with the respective terrain types permit rather accurate identification, particularly from airphotos. An experienced interpreter can make an initial terrain inventory very rapidly, providing a basis for initial site selection and choice of construction technique.

Following are some examples of common terrain types, drawn mainly from the Mackenzie Valley, which will show the diversity of northern terrain types, and illustrate some of their diagnostic features:

Figure 2
Thermokarst glacial lake plain, near the confluence of
Great Bear and Mackenzie Rivers, District of Mackenzie, NWT.

At the very sensitive end of the scale are glacial lake plains, underlain by ice-rich silt and clay, and characterized by very irregularly shaped thaw or thermokarst ponds and lakes (Figure 2). The ponds enlarge by sporadic melting and collapse here and there around the margin, giving the ponds a very ragged outline. Non-frozen soil known as a thaw-bulb underlies the ponds.

The high ice content of the glacial lake sediments can be seen in retrogressive-thaw flows that occur widely where glacial lake sediments are exposed along the margins of streams or lakes (Figure 3).

Figure 3
Retrogressive-thaw flows in glacial lake sediments, north bank of Mackenzie River about 25 kilometres upstream from Arctic Red River.

The ice may occur as a reticulate network, as layers of clean segregated ice, or as thin discontinuous lenses (Figure 4). There are probably several hundred such flows active in Mackenzie Valley at any one time and thousands of scars of inactive flows are visible on airphotos. They develop by melting and retreat of a steep headwall, the melted soil-ice mixture flowing away as a slurry. Usually, they run their course in ten to twenty years, often melting headward a kilometre or more.

Alluvial silt plains, including the vast modern Mackenzie Delta, also commonly have numerous thermokarst ponds, but the ice content of the silt is typically less than that found in glacial lake sediments. If vegetation is stripped from the surface, resultant degradation of permafrost commonly reveals the presence of ice wedges that form a polygonal network (Figure 5). The tops of the ice wedges lie just below the normal depth of annual thaw.

Figure 4
The backwall of a retrogressive-thaw flow, Grandview Hills, west of Mackenzie River between Fort Good Hope and Arctic Red River. Silty clay with a reticulate network of segregated ice occupies the synclinal depression upper centre, and is underlain by layers of clean segregated ice alternating with ice-rich silt.

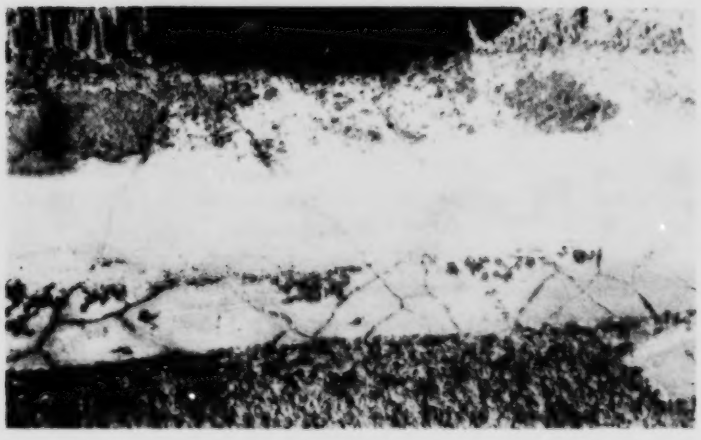

Figure 5
An airstrip built on thermokarst alluvial silt,
Arctic Red River, NWT. Removal of the vegetation cover resulted in melting out of a polygonal network of ice wedges.

Thermokarst glacial lake or alluvial plains present major problems for buried pipelines. A reasonably straight route must inevitably cross numerous ponds, so that the ditch would be dug alternately in ice-rich silt and clay, and the thawed and water saturated sediments that underlie the ponds. A pipeline operated in warm mode would melt the ice-rich sediments, removing support from beneath the pipe. On the other hand, operation in chilled mode would lead to build-up of segregated ice in an annulus around the pipe, where it crosses unfrozen sediment, with resultant heave.

In rolling to hummocky moraine, ground ice tends to occur as irregularly shaped and erratically distributed masses. Degradation of permafrost in such terrain can lead to formation of irregularly shaped collapse pits and initiation of mud flows (Figures 6,7).

Figure 6
Aerial view of collapse pits and a mudflow in a borrow pit in rolling moraine, south side of Dempster Highway between Arctic Red River and Fort McPherson, NWT.

Figure 7
Collapse due to permafrost degradation in a borrow pit in rolling moraine; same locality as Figure 6.

In till plains (Figure 8) it is common to find an aggregate thickness of 50 cm and exceptionally a metre or more of segregated ice in the uppermost three metres. The ice occurs as lenses a few millimetres to a few centimetres thick, and is distributed fairly uniformly areally, so that degradation of permafrost in till plains produces only moderate differential subsidence.

Figure 8
Till plain with subparallel drainage, Canot Lake map area, NWT.

The parallel "horsetail" drainage seen in Figure 8 is common on gently sloping till plains. Roads built across the drainage require numerous culverts in order to avoid concentration of drainage and initiation of erosion. Till plains may have buried ice wedge systems (Figure 9) and where thick blankets of till occur, the till may contain enough ice for development of retrogressive-thaw flows similar to those found in glacial lake sediments.

Figure 9
Polygonal network of trenches due to melting out of
ice wedges in a till plain, following removal of vegetation;
adjacent to Demptser Highway at Km 88 between
North Fork Pass and Chapman Lake, Y.T.

Peatlands of the region commonly consist of 2 to 3 m of peat overlying glacial till or glacial lake sediments. Usually there is no segregated ice in the peat itself, but it may occur in subjacent till or glacial lake deposits. Shallow thermokarst ponds are common, but they tend to grow in quickly with sedge mats (Figure 10). The peatlands typically have a cover of lichen, mostly species of **Cladonia**, **Cladina** and **Cetraria**. The lichen cover produces a characteristic light tone on air photos. Peatland may have a polygonal network indicative of ice wedges, but absence of a visible network does not guarantee absence of the wedges.

Figure 10
Thermokarst peatland, south of Norman Wells, NWT. Pond areas are covered by floating sedge mats. Lichen ground cover between stunted black spruce trees produces light tones on airphotos.

Glacial gravel areas are typically well drained, with open spruce-lichen woodland vegetation that produces tones on airphotos similar to those associated with peatland, but the thermokarst ponds and depressions that distinguish most peatland are lacking. Traces of ice wedges may be seen in glacial gravel at least as far south as 66° 00'N (Figure 11). The ice wedges may have been melted out at that latitude, but remain and pose construction problems at higher latitudes.

In the Mackenzie Valley region, the sensitive glacial lake sediments and the alluvial sediments occur mainly along the valley axis in the most favourable position topographically for construction of pipelines or highways, but bordering till plains of low to moderate sensitivity afford routing that can be utilized with employment of appropriate construction techniques.

Glacial gravel deposits, though affording adequate supplies of aggregate and potential sites for communities, airstrips, etc., are too widely scattered to be of much use in the routing of linear facilities. Rolling to hummocky moraine is more widespread, but construction of Dempster Highway has demonstrated that pad construction can be effective in retaining permafrost beneath a highway built on such terrain, provided that there has been minimal disturbance of the surface, that the pad is of adequate thickness and that construction is undertaken in winter when the active layer is frozen.

Figure 11
Glacial gravel with ground cover of Lichens, Doll Creek, south end of Richardson Mountains, Y.T. At this locality it is not known whether ice wedges remain beneath the polygonal network visible at the surface.

Terrain maps or surficial geologic maps published by the Geological Survey of Canada are available at scale 1:250,000 for most of the Mackenzie Valley and the Beaufort Sea coast; and open-file maps at scale 1:125,000 are available for the remaining area. Data on engineering properties, terrain sensitivity and environmental constraints are included on the maps, and comprehensive reports that supplement the maps are available for both the Mackenzie Valley and the Beaufort Sea coast.

Available maps and reports are adequate for a first cut at aligning a highway or pipeline, or locating an airstrip, and refinements are possible from further photo interpretation and ground checking. The services of a geologist are cheap compared with the cost of mounting drill programs, especially in the North where heavy helicopters may be needed to move the drills. The possibilities of photo interpretation and ground checking should be exhausted before embarking on a drill program. Differences in the distribution of ground ice in the respective terrains should dictate differences in drilling strategy, in order to avoid expensive overkill or seriously deficient coverage.

Construction in the permafrost areas can be approached in three ways. Firstly, one could follow early practice, allowing degradation of permafrost, accepting any consequences and accommodating to them. This is acceptable only for very simple structures, and where there are no possible environmental consequences. Deliberate degradation of permafrost is, of course, an essential part of placer mining, and is practical for borrow sources with low ground ice content.

In the second approach, which might be called the passive approach, the permafrost is carefully preserved by use of gravel pads or pilings for buildings, pad construction for highways, and pile support for pipelines. Design is important, even in such simple matters as determining the required pad thickness to prevent permafrost degradation under the prevailing climatic conditions.

In the third approach, which might be called invasive, the structure is placed within perennially frozen soil, and measures are taken to prevent thawing. Operation of buried pipelines in a chilled mode has already been cited as one example. Underground mining of frozen gravel was common by the turn of the century in Yukon and Alaska, and the practice has been revived in recent years. The mining is done in winter, and cold air at ambient temperature is circulated to maintain the permafrost. Insulating barriers are placed at the mine portal during summer.

The foregoing assumes essential stability of world climate, with no significant change in the distribution of permafrost. If predicted increases in world temperature, and especially polar temperatures, are realistic, then engineers and planners will be faced with vastly more complicated problems than have been encountered heretofore. The challenge will be to design facilities that are structurally and environmentally sound today, and remain so in the radically changed climatic and permafrost conditions expected 50 years hence. Maintaining the viability of existing facilities may ultimately prove to be an even greater challenge. Clearly, detailed knowledge of present day terrain and permafrost conditions, and an understanding of the natural and man-induced processes occurring in the permafrost regions, will be critical factors in meeting the challenges.

QUESTIONS/DISCUSSION

Ray Robinson: Dr. Hughes, I'd like your reaction to two propositions that I've been exposed to quite recently as part of this conference which, as you know, began up North. When we went to Norman Wells, we were shown the operation of a chilled oil pipeline. I say chilled because it's unusual to have a chilled oil pipeline. Apparently, the wellhead temperature in the summertime, of the oil, is about 24 degrees, but they have to chill this to -5°C and from there on, apparently, the oil, which is in a buried line, takes on the temperature of the earth around it. We were told in the briefing that there doesn't appear to be any particular difficulties with this. I'd like to get your reaction to that as a construction mode and the implications of a larger pipeline down the whole of the Mackenzie Valley joining into it. As I understand it the oil that is produced in Norman Wells is of a nature that it is fairly easy to move even in cold temperatures, but that isn't true of all oils and one might face different kinds of oils in different places. I wondered if you could speculate a little bit about that?

The other question goes back to our common experience of serving on a panel looking at the Foothills proposal for the Alaska Highway pipeline. In that situation, you will recall the preferred construction mode was that of a berm. Basically modelled after the concept of a raised pipeline similar to that one sees in the Prudhoe Bay situation except on a berm rather than raised on piles. Yet the proposal for a gas pipeline down the Mackenzie Valley, in what I assume were similar conditions, is for a buried line. The view seems to be that this is adequate in an engineering sense. I've heard very conflicting views from people on this. I'd like you to give us some sense of what changes in technology might have occurred that have allowed the one group to look to a buried pipeline whereas the other group felt they had to have one on a berm in order to deal with this continuous permafrost.

Owen Hughes: Well, I'm really the wrong person to be asking these questions of because my background is geology. I look at the ground conditions, and then leave it to the pipeline designers to meet the problems that these conditions pose. I think we will have speakers further along who can cover that much better than I can. But, I must say that I personally prefer passive modes of construction. The berm system would be included there, the elevated pipeline, such as the Prudhoe Bay Valdez line, certainly falls in that category where it is elevated. I sense that going from Norman Wells to Zama Lake, there will be problems that will arise with a very large pipeline that aren't encountered with the smaller one, either that or the minor problems they've had so far would be significantly increased.

Branko Ladanyi: During the past ten years, how much have environmental constraints changed? Did they change in a positive or negative manner? What is now the situation if you compare it with 10 years ago?

Owen Hughes: People have come to realize that there are very many features such as mudflows in the landscape and that in a worst case scenario, a number of such features could be created by a pipeline. Also, some of the anticipated effects, such as siltation of the streams, creating problems for fish, and so forth, are natural phenomenon, which are quite significant compared to what could be caused by human action. And, of course, I think people are more willing now to judge the oil pipeline construction more on the basis of the same way they would, say, of placer mining. Placer mining must allow for a very considerable siltation of streams. People are willing to look at what effects are occurring and not just jump to the conclusion that this must be a very serious problem. So, I think there is a lessening of constraints, but, I think that it's a reasonable lessening of constraints.

5.2

COLD OCEAN HYDROCARBON RESOURCES: NEEDS AND MEANS OF DEVELOPMENT IN THE FUTURE THE C-CORE EXPERIENCE

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INTRODUCTION

Research and development related to the resources underlying the Arctic Ocean and the Grand Banks started seriously in the 1970s and has gained momentum since then. The major difference between the Canadian offshore and that of other hydrocarbon reservoirs under development or production in the offshore elsewhere in the world is that virtually all of the waters of Canada are invaded by or covered by ice for part of every year. It is therefore understandable that a great deal of the research in the Canadian offshore regions has focussed on ice. Another unique aspect of the Canadian offshore, particularly in the Arctic, is the seabed which is complex and variable. Although equally complex on the eastcoast in terms of lithology, the seabed is much more competent as a foundation material. The presence of permafrost and gas hydrates in the offshore and Arctic regions add further complications to the development of hydrocarbon resources.

Research in the Arctic is being driven to a large extent by the requirements of the oil and gas industry. At the same time, the federal government has carried out a number of baseline studies and has initiated research projects complementary to those of industry.

Off the eastcoast of Canada the oil and gas industry and federal government are also the major drivers of research but the fishing industry and transportation industry are playing an increasingly important role in research as seasons are extended in northern regions.

FUNDING OF RESEARCH IN CANADA

It is instructive to look at the trends of research funding in Canada over the past decade. A federal government White Paper issued in 1978 set out certain goals that were to serve as the framework for R & D funding in Canada for the coming years. Figure 1 shows the percentage of gross expenditure on engineering research and development (GERD) as a percentage of the gross national product (GNP). It can be seen that there had been a gradual fall off from 1967 until about 1980. In 1978, a target of 1.5% of the GNP was set as achievable for GERD by the year 1983. What this document did not address was where the skilled research personnel required to achieve the objective of 1.5% GERD/GNP within 5 years would come from and how the turn around would be realized. Table 1 shows the proposed sources of funding and the proposed performers as anticipated by the policy makers at that time. It can be seen that it was intended that the level of federal government funding would reduce significantly from 39 to 33 and that the performing of research in government labs would be reduced even more from a level of 25.5% in 1975 to 15.7% of all research by 1985. Industry funding was to increase from about 36% to 50% by 1985 and industry performing of research was to increase even more, being 44.2% in 1975 with a target of 63% by 1985. The total expenditure on R & D in 1979 was approximately $2.5 billion.

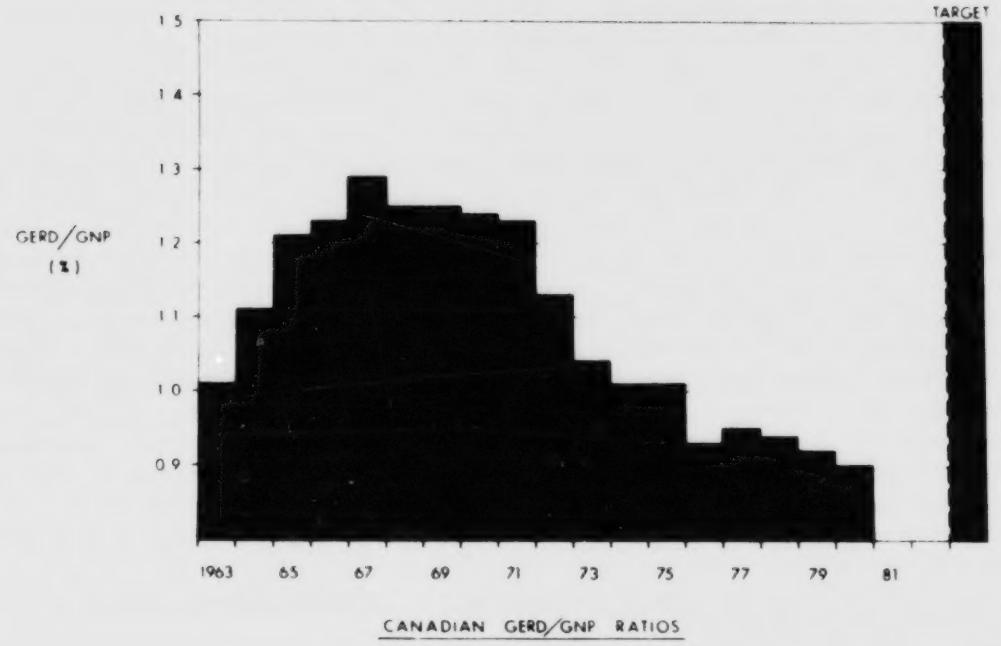


Figure 1
Canadian GERD/GNP ratios published in 1978
(1979 and 1980 added later; 1983 is target published in 1978)

Over the past decade, a steady growth of the gross expenditure on R & D has been realized. It has progressed from a low of approximately 1.0% of the GNP in 1980 to the present level of approximately 1.4%. In absolute dollars, the 1988 expenditure amounts to approximately $7.6 billion, an increase of almost 3-fold in ten years. In terms of constant 1986 dollars, the increase is about 65%.

Considering the present level of funding for research and development and the trend over the past few years, it can be said that there has never been a better outlook for R & D in Canada. The federal government has demonstrated a strong commitment to science and technology. A funding commitment has been made to the Natural Sciences and Engineering Research Council (NSERC) for its 5 year plan (for the first time in 1984-1985) and industry support and participation in research and development is now at an unprecedented high. This is shown by Table 2 which illustrates actual funding and performing of research for 1985-1988 in comparison to the level that had been targeted in 1978. These figures demonstrate that the federal government percentage of funding of research is somewhat below what was targeted and that their performing of research remains at a higher level than had been targeted. Industry has moved a long way in increasing its funding and performing of research, although both are less than the targets set in 1978. It is interesting to compare the present level of university sector performing and funding of research to what was expected in 1978. Both are significantly above what was targeted.

TABLE 1

Gross Expenditures on R&D as a Percentage by Funding and Performing Sectors

	1979	1985 Target
Funding Sector		
Federal	38.9	33.3
Provincial	6.9	6.6
Industrial	35.8	50.0
University	13.9	7.6
Other	4.4	2.5
Performing Sector		
Federal	25.5	15.7
Provincial	3.6	2.5
Industrial	44.2	63.0
University	25.9	18.4
Other	0.8	0.5
Total $M	2,500	7,500

(MOSST - 1978)

The last few years have seen much more interaction between the university, industry, and government R & D sectors and much more cooperative research to make use of the limited and widely spread research-oriented human resources in Canada. Several initiatives have helped to make this happen. For example the cooperative research and development program (CRD) introduced by NSERC in 1985 has triggered much more interaction between industry and universities. This includes increased funding of university research by industry as well as joint participation of researchers on common research projects. In addition, the federal government policy of providing matching dollars for industry support of research in Canadian universities has generated additional funding that can be applied to both basic and applied research in the university communities. Some federal government laboratories are now encouraged to compete for industry funding and targets have been set for a level of "self-reliance". This has led to more interaction with industry and universities.

During this period the research climate in Canada has changed significantly and a new research culture has emerged (Pallister, 1986). This is reflected by the growth of research institutes that are university-based and which make use of the intellectual resources of one or more universities but which are funded from outside the university by industry and government. The institutes draw upon the research capabilities and resources of all three sectors in the research community.

TABLE 2

Percentage of GERD/GDP

	Target for 1985 (set in 1978)	Actual 1988
Funding Sector		
Federal Government	33.3	32
Industry	50	42
Universities	7.6	10
Performing Sector		
Federal Government	15.7	18
Industry	63	56
Universities	18.4	23

One of the first of such self-reliant university-based research organizations in Canada was the Centre for Cold Ocean Resources Engineering (C-CORE). C-CORE has now been in existence for approximately 14 years and has served as a model for several other types of research institutes using the same principles. The method of operation of the organization and how this approach can serve the research and development needs of Canada in relation to future hydrocarbon development in the Arctic is described in this paper.

C-CORE EXPERIENCE

C-CORE was started with a grant from The Devonian Group of Charitable Foundations. The initial funding enabled C-CORE to start at a fast pace and to pick up on major research needs within its particular mandate. The C-CORE mandate, set in 1974, has four objectives:

- to help develop engineers and scientists competent to work in the cold ocean environment
- to identify impediments to northern offshore resource development and to contribute to removing them or to interest others in the challenge and timely solution of such problems
- to stimulate the timely publication of the results of cold ocean engineering research
- to contribute to the development of Newfoundland and Labrador as a centre for cold ocean engineering

The intention of the initial block funding was to get a research activity going but it was also necessary for the research group to demonstrate its ability to attract funding from other sources as the Devonian support wound down over the first few years. The Devonian funding was the principal source of research dollars for C-CORE for the first five years but by 1980 the organization had become self-reliant on the strength of grants and research contracts from industry and government.

The research activities, since the inception of C-CORE, have always reflected the priorities of industry and government. The priorities are established by very frequent contact with the supporting groups and by interaction through a Board of Governors, comprising senior representatives from the petroleum industry, federal government and provincial government as well as businessmen drawn from the local community. The early research work at C-CORE was to a large extent directed towards providing a better understanding of the ocean environment since so little was known at that time, particularly about the occurrence and behaviour of ice. The research program gradually evolved into a three-prong thrust addressing ice engineering, seabed geotechnics and remote sensing.

During 1984 a long range research plan was developed. This plan emerged from a series of meetings with Associates and finally, from a workshop held at the annual Associates Meeting. The Associates are the financial supporters of C-CORE. When they meet it is usual that other participants from government, other universities and research organizations are invited as well. The research plan that emerged following the meetings held early in 1984 was widely circulated to government and oil industry users of the research and their feedback was sought and obtained. This resulted in a document that was taken before the Board of Governors for approval in the fall of 1984. The plan was approved and at the same time a financial plan reflecting the amount of dollars required to make it all happen was developed. It is the responsibility of the organization to raise the money to achieve the research objectives.

Each year the research plan is fine-tuned after the meeting of Associates when the research groups report on their past activities and those planned for the following year. This provides an invaluable means of determining what the priorities should be and what adjustments should be made to the research program to reflect real world needs. Clearly all of the research at C-CORE is targeted and is pulled by the market place. Although there is a great flexibility within the programs, there is not a freedom of research that is available to academic researchers since the scope of the C-CORE activities is carefully selected and clearly defined along specific lines.

Although the five year plan is reviewed every year, it is subjected to a major review at the half-way point. Revisions are made if they are required to reflect changing priorities identified by the users. Accordingly, in 1986, an extensive workshop was held wherein a number of development scenarios were identified and the research requirements for each one was discussed. The development scenarios that were reviewed at that workshop and the applicability to the C-CORE research groups are shown in Table 3. The workshop resulted in a new five year plan and once again a financial plan was developed to determine the cost of implementing the research program. At about that time, a major grant was received from the Offshore Development Fund that was established as part of the Atlantic Accord. This grant

TABLE 3

Development Scenarios and Related Research Activities

OPERATIONAL SCENARIOS	C-CORE RESEARCH ACTIVITIES								
	ICE ENGINEERING			REMOTE SENSING			SEABED GEOTECHNICS		
	Mechanical Properties	Dynamics	Ice-Structure Interaction	Target Detection	Environmental Measurement	Basic Electromagnetics Signal Processing	Marine Geotechnics	Marine Geophysics	Marine Geology
EAST COAST:									
Floating Drilling with Ice/Iceberg Avoidance		X		X	X	X		X	
Floating Drilling with Ice/Iceberg Tolerance	X	X	X	X	X	X	X	X	X
Production: Fixed Platform/Full Ice Tolerance	X	X	X	X	X	X	X	X	X
Production: Floating Platform/Some Ice Tolerance	X	X	X	X	X	X	X	X	X
Production Floating Platform/Ice Avoidance		X		X	X	X		X	
Ice Scour Protection		X					X	X	X
BEAUFORT SEA:									
Exploration Using Present Technology	X	X	X				X	X	X
Exploration Using New Technology	X	X	X		X		X	X	X
Production: Seasonal/Molikpaq	X	X	X	X	X	X	X	X	X
Production: Full Field Development/CRI	X	X	X	X	X	X	X	X	X
OTHER ISSUES:									
Year-Round Navigation NW Passage	X	X	X	X	X	X			
Ports/Harbours: Supporting Production	X	X	X	X	X	X	X		
Northumberland Straits Crossing	X	X	X				X	X	X
Small Harbours: Nearshore Ice	X	X	X						
Canadian E.E.Z. and Sovereignty Issues	X	X	X	X	X	X	X	X	X
Ocean Information Systems	X	X	X	X	X	X	X	X	X
Operational Fisheries Management	X	X	X	X	X	X			

was in response to a proposal that was submitted by the Centre in early 1985 to cover off those sections of the long term research plan that traditional sources of funding would not meet. The proposal was based on the five year research plan. A commitment was made by the Centre to obtain $11.25M in funding from its traditional sources to match the $5M from the Offshore Development Fund. Funding from traditional sources has to be achieved in order to acquire the Development Fund support.

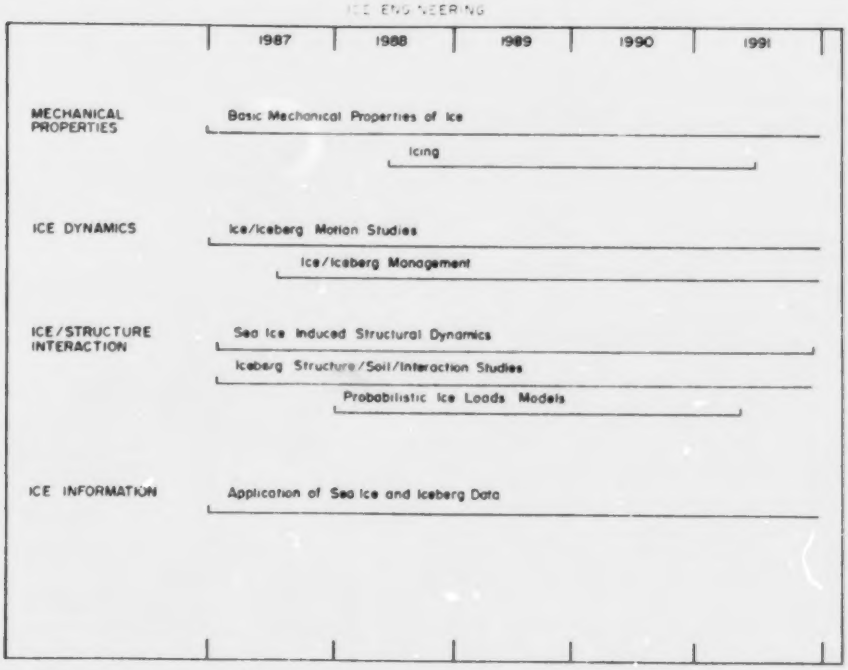


Figure 2
Five year research plan - Ice Engineering Group

Figures 2, 3 and 4 illustrate in simple form the 5-year research plan for the Ice Engineering Group, the Seabed Geotechnics Group and the Remote Sensing Group respectively. Figure 5 is a summary of the 5-year financial plan illustrating the targets that must be achieved to meet the objectives set out in the research plan and to fully integrate the support of the Offshore Development Fund.

The research plan is very flexible in that new initiatives or research opportunities can be accommodated even though they lie outside the mainstream research activities reflected in the plan. If these activities have a long term research requirement, they are reviewed and integrated at the next major research plan upgrading workshop of the Associates.

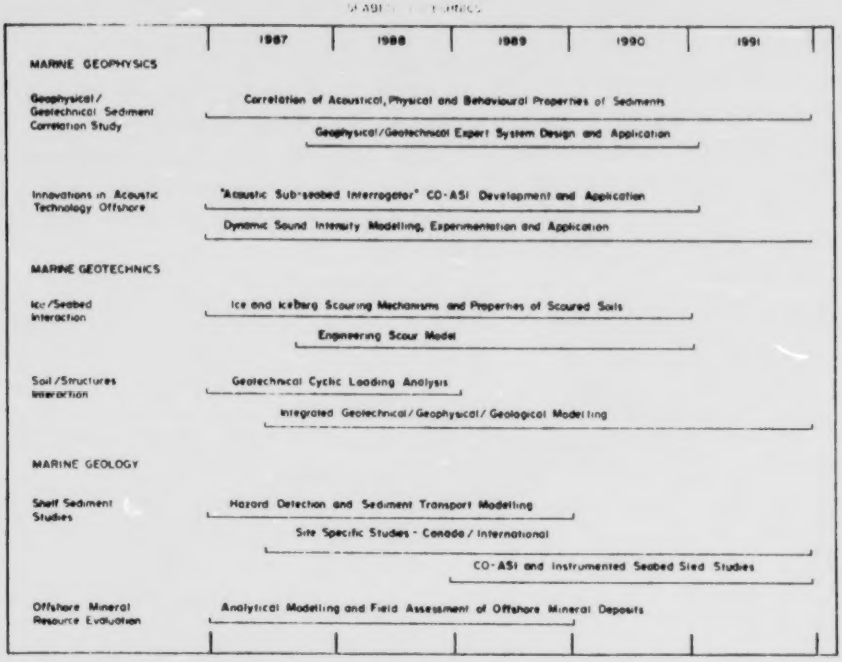

1987
1988
1989
1990
1991
MARINE GEOPHYSICS
Geophysical / Geotechnical Sediment Correlation Study
Correlation of Acoustical, Physical and Behavioural Properties of Sediments
Geophysical/Geotechnical Expert System Design and Application
Innovations in Acoustic Technology Offshore
"Acoustic Sub-seabed Interrogator" CO-ASI Development and Application
Dynamic Sound Intensity Modelling, Experimentation and Application
MARINE GEOTECHNICS
Ice /Seabed Interaction
Ice and Iceberg Scouring Mechanisms and Properties of Scoured Soils
Engineering Scour Model
Soil /Structures Interaction
Geotechnical Cyclic Loading Analysis
Integrated Geotechnical / Geophysical / Geological Modelling
MARINE GEOLOGY
Shelf Sediment Studies
Hazard Detection and Sediment Transport Modelling
Site Specific Studies - Canada / International
CO-ASI and Instrumented Seabed Sled Studies
Offshore Mineral Resource Evaluation
Analytical Modelling and Field Assessment of Offshore Mineral Deposits

Figure 3
Five year research plan - Seabed Geotechnics Group

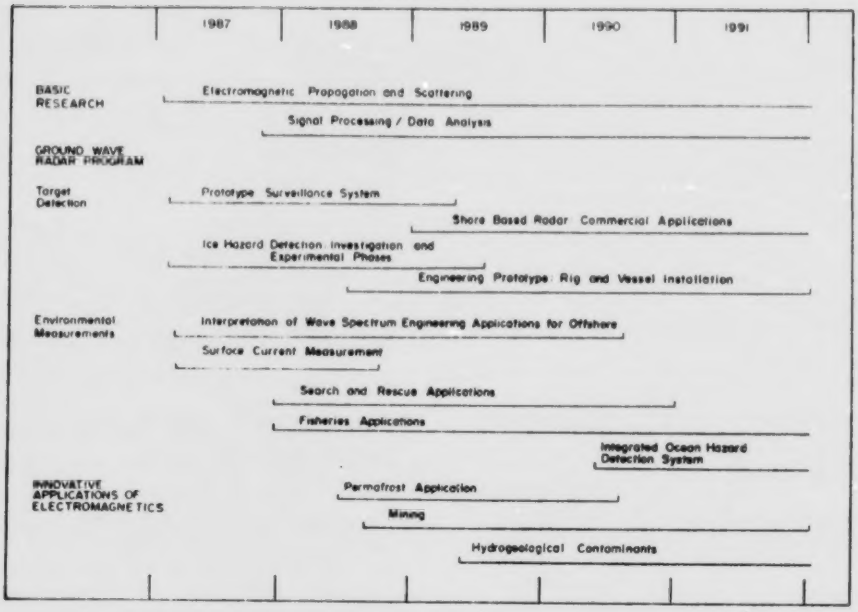
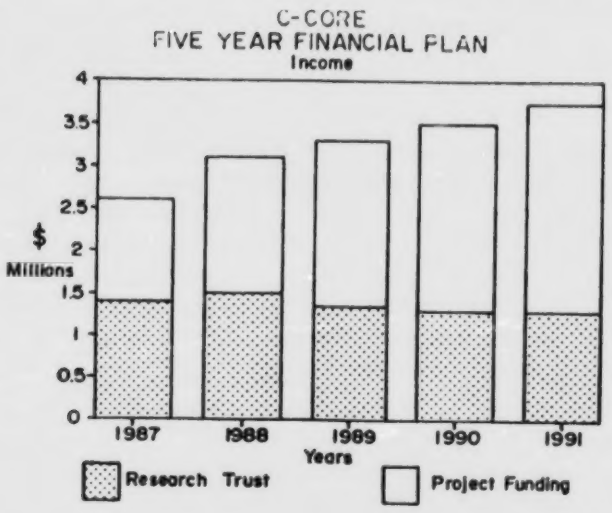


Figure 4
Five year research plan - Remote Sensing Group



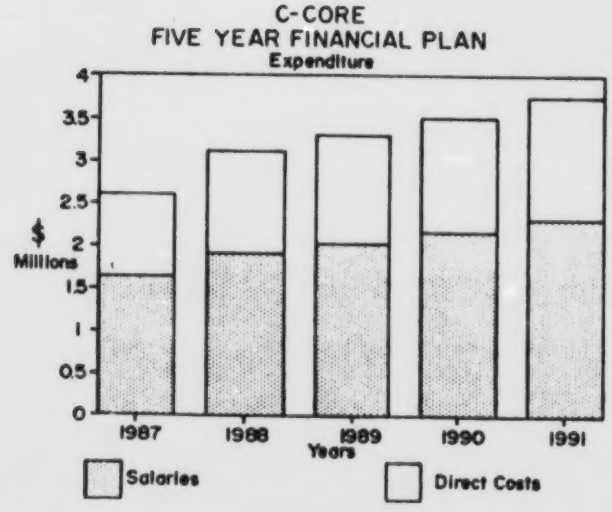


Figure 5
Five year financial plan - income and expenditures

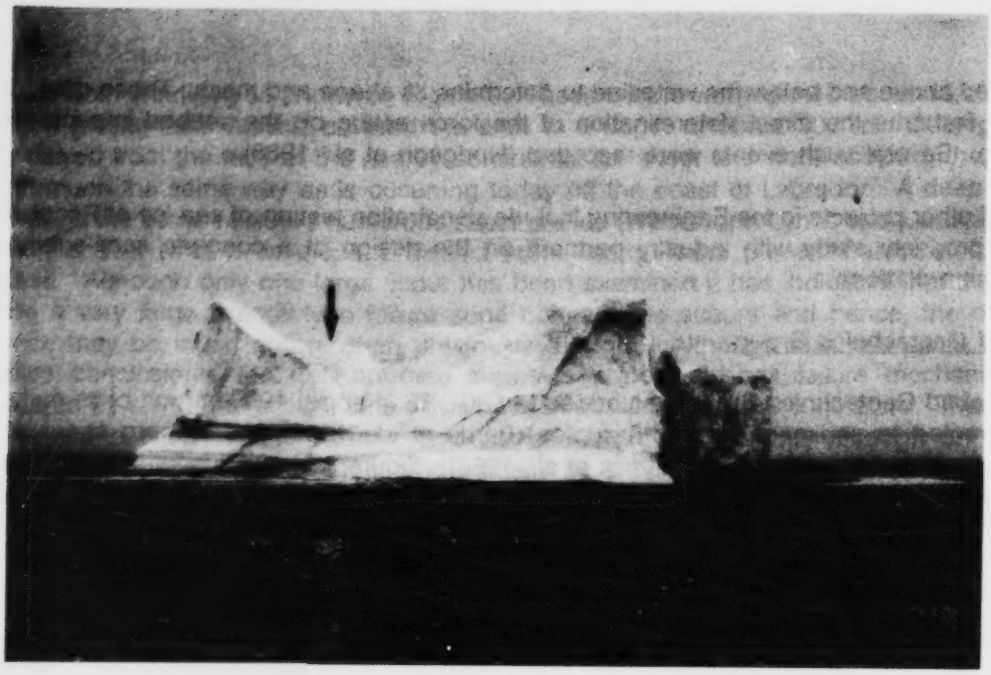
EXAMPLES OF RESEARCH ACTIVITIES

Ice Engineering Group

Twenty years ago, very little was known about ice in, and covering oceans. Because of this, much of the early work at C-CORE was directed to gathering data on qualitative aspects of the sea ice and glacial ice in the oceans. The work has gradually evolved into more quantitative aspects of ice behaviour and properties that are needed for design of structures to operate in the ice-invaded oceans. An example is the program of ice motion studies wherein motion sensing instrumentation packages were deployed on glacial ice including growlers, bergy bits, small icebergs and large icebergs as well as model ice motions studies in a large wave tank (Lever at al., 1986). Figure 6 shows an example of an ice motion package being deployed on a growler in Byron Bay, Labrador.

Figure 6
Deployment of ice motion sensor package,
Byron Bay, Labrador.

The same type of ice motion packages were used on a joint Ice Group - Seabed Group large scale experiment known as the Dynamic Iceberg Grounding and Scouring Experiment (DIGS). The DIGS project grew out of early research work on seabed scours caused by icebergs that had been undertaken by scientists at the Atlantic Geoscience Centre and C-CORE. It was sponsored by the Environmental Studies Revolving Fund and contracts were called to survey icebergs as they scoured the seabed. C-CORE provided two of the three scientific advisors on the project and provided the instrumentation packages, interpreted the motion package data and provided quality control for assembling the report. The prime contractor for the project was Geonautics Ltd. Figure 7 shows an iceberg splitting event where approximately one-half of a 15 million ton iceberg split off and crashed into the seabed over a period of a few seconds. The acceleration was recorded and the hard grounded iceberg was carefully



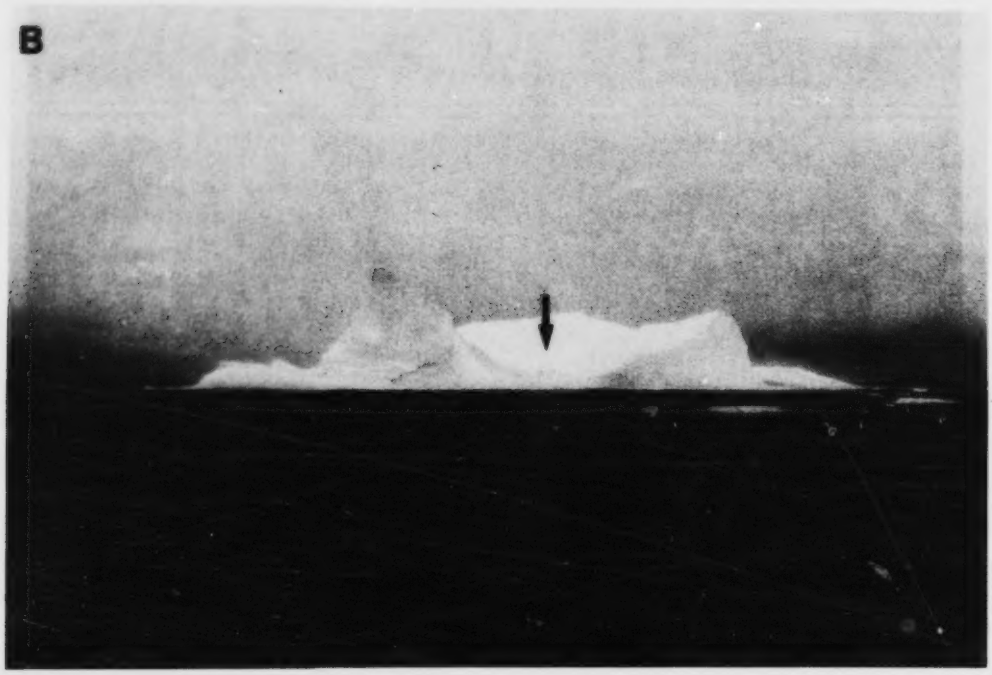


Figure 7
Iceberg splitting and grounding event
DIGS Project (Hodgson et al., 1988)

surveyed above and below the waterline to determine its shape and mass. These data allowed for the first time the direct determination of the force acting on the seabed impacted by an iceberg. Several such events were recorded (Hodgson et al., 1988).

Several other projects in Ice Engineering include penetration testing of sea ice at Resolute Bay and a propriety study with industry partners on the design of a concrete semi-submersible production platform.

Seabed Geotechnics Group

The Seabed Geotechnics Group was added to C-CORE in about 1980. Much of its early work was directed to sediment transport studies (Barrie et al., 1986) and iceberg scour studies (Gustajtis, K.A. 1979, Woodworth-Lynas et al., 1986). Figure 8 shows a section of the seabed on Makkovik Bank which has experienced extensive iceberg scour.

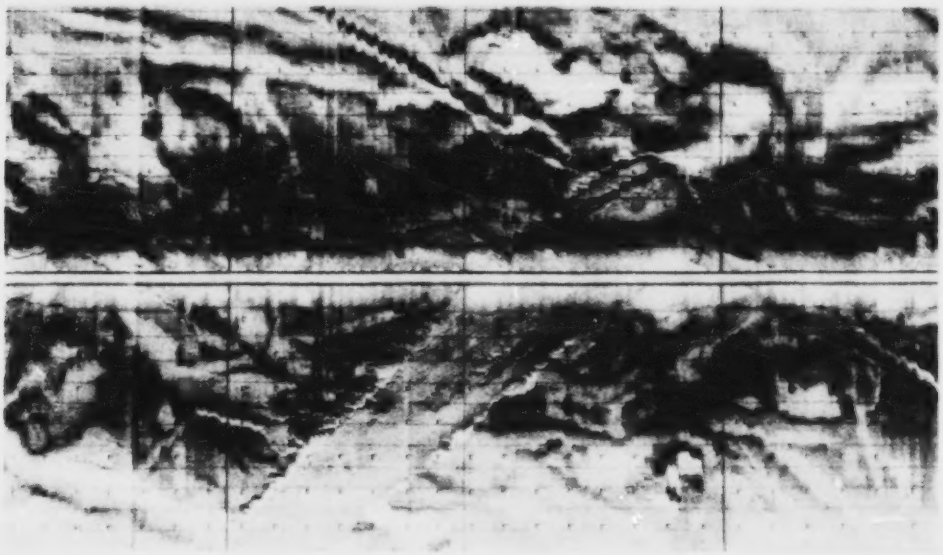


Figure 8
Sidescan sonogram showing a fresh iceberg scour

It is probable that the entire seabed is reworked to a depth of several metres about every 25 years. The Department of Fisheries and Oceans has provided generous access to its submersible PISCES IV when it was available on the eastcoast and the Canadian Navy has provided exceptional support by allowing access to its submersible SDL-1 and the host ship HMCS CORMORANT. Use of the submersibles allows scientists and engineers to descend to the seabed and to observe iceberg scours and iceberg created seabed pits (Clark and Landva, 1988). What has not been possible is excavations into the scours to observe and test the soils beneath them to help understand the forces acting on the seabed below a scour when it is being formed. This opportunity became possible for relict ice scoured terrain which exists a

few miles from Winnipeg as shown by Figure 9. These scours were formed about 10,000 years BP when glacial Lake Agissiz covered the area to a depth of about 300 m. Icebergs were being calved from the face of the nearby continental ice sheet and were scouring the bottom soils in much the same way as is occurring today off the coast of Labrador. A deep test pit cut through the scour revealed numerous shear planes (Woodworth-Lynas and Landva, 1988). The soil is such that it develops a distinct fabric along shear planes that can be readily identified. Although only one large scour has been examined it has indicated that there may well be a very large Prandtl-type failure zone beneath the scours and hence, the depth of influence may be much greater than previously thought. Although it is premature to draw definitive conclusions, the data to date suggests a possible soil failure mechanism not considered by any of the scour models that have been described in the literature. This project was funded partially by the Atlantic Geoscience Centre and partially through an NSERC Operating Grant held by the author and partially by a NSERC Strategic Grant held by J.Y. Guigné and the author. There were many participants that contributed to the scour investigation work including Mr. Niel Burgess, P.Eng. of the Winnipeg consulting engineering firm, Burgess and Dyregrov, the Department of Transportation (Dr. Ganny Ganapady), the University of Manitoba (Dr. Don Shields and Dr. Jim Graham), and the Department of Mines and Energy, Manitoba. Much information remains to be mined from this scour field.

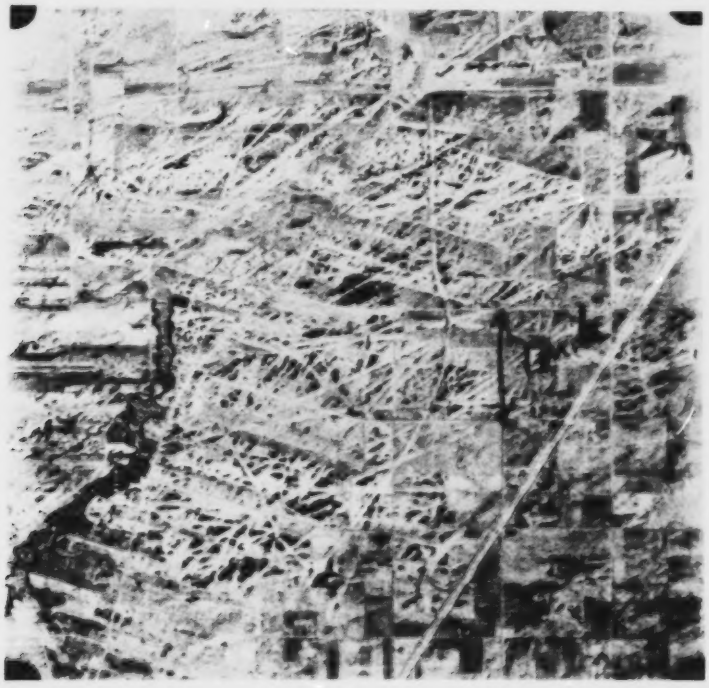


Figure 9
Iceberg scoured terrain in Glacial Lake Agissiz near Winnipeg

Another major activity of the Seabed Geotechnics Group has been directed to developing more comprehensive and cost-effective means of exploring and testing the seabed. The main thrust of this activity has been directed to the development of an Acoustic Seabed Interrogator (Guigné, 1986). The present concept, known as a conventionally optimized Seabed Interrogator (CO-ASI) is illustrated conceptually in Figure 10. Figure 11 shows the prototype launched and ready for submersion for the first field trials in Conception Bay. The objective

of this equipment is to obtain an "acoustic core" from sound reflections as shown in Figure 10. This is achievable for a depth of 50 to 100 metres in a matter of minutes with the data being interpreted by a sophisticated neural computing network. Preliminary bench scale testing has yielded promising results (Clark and Guigné, 1988). Because of the potential cost-effectiveness of this device, it has received strong support from industry and government funders. An industry partner has been working on other aspects of the ASI and will have first right-of-refusal to commercialize the instrument when it is ready. Other Seabed Geotechnical research is being directed to offshore minerals particularly placer deposits (modelling, detection, mining and environmental impact research) and to in-situ testing of properties by means of a drop penetrometer for correlation with the CO-ASI work.

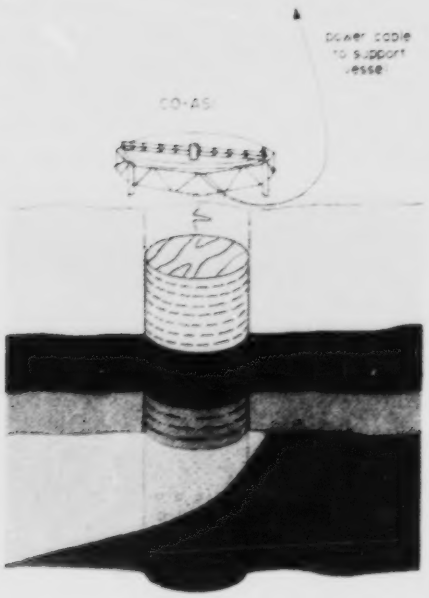


Figure 10
Conceptual representation of the CO-ASI taking
an acoustic core of the sub-seabed

Remote Sensing Group

The Remote Sensing work at C-CORE is probably the most mature research activity at the Centre. It was started when the Centre was initiated and for the past eight years has been focussing specifically on the use of groundwave radar for over-the-horizon detection of ice and other targets and for remote measurement of surface currents and wave conditions. Figure 12 illustrates the concept for a rig-based system to provide detection of glacial ice or sea ice for a distance of approximately 100 kilometres.

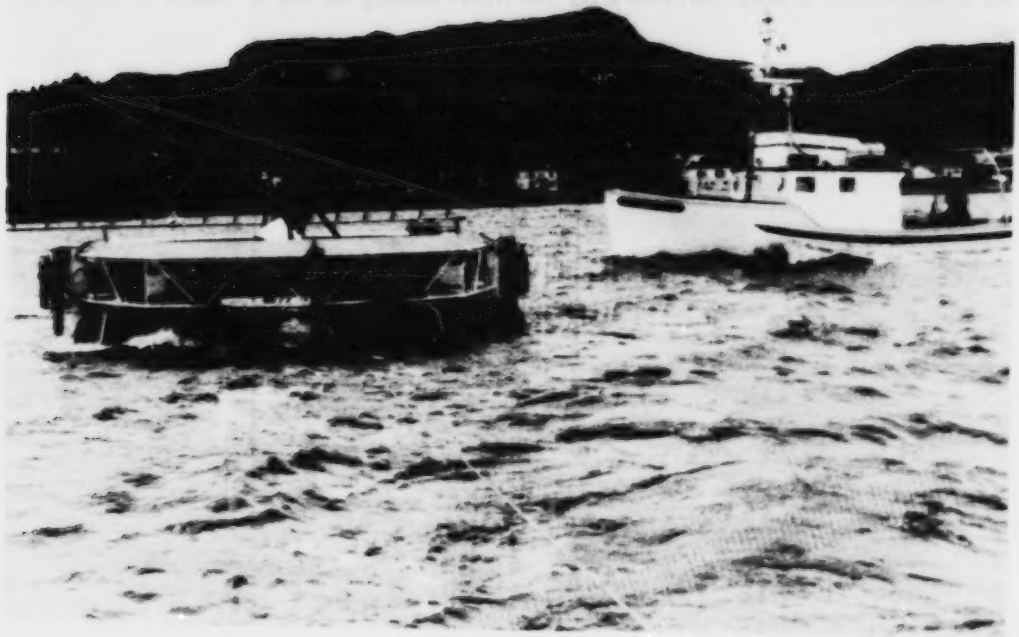


Figure 11
CO-ASI field trials, Conception Bay, Newfoundland

In the early stages of the research, extensive field experiments were carried out to provide data that could be used to develop a model to solve the clutter problem. By necessity the experiments were carried out from land. The clutter problem was solved and several field trials confirmed that ice over the horizon could be readily detected by groundwave radar. Figure 13 shows the model and Figure 14 illustrates the actual return. Since the ice moves it can be interrogated for several minutes if necessary to enhance the signal. The centre spike near zero Doppler shift on Figure 14 is ice. The same technique can also be used to detect other floating objects as well as low flying objects. Operation of the groundwave system from a drill rig or a ship is more complicated in that returns from 360^{O} obscure the zero Doppler zone. In addition, the most appropriate antennae is yet to be determined and means to take into account the motion of the rig or ship need to be developed. Nevertheless, by 1986 it was recognized that the research required to interpret a land-based groundwave radar system was largely completed and it was decided that this aspect of groundwave radar would be moved from C-CORE to industry. Northern Radar Systems Limited (NRSL) was formed to commercialize the technology. A portion of NRSL is owned by Seabright Corporation, an industry formed to assist technology transfer from the university to industry. Other shareholders are the principal researchers and a venture capital company. Funding has been acquired by NRSL to construct a land-based demonstration site at Cape Race, Newfoundland to monitor a sector with a range of 400 km to the limit of the Exclusive Economic Zone. Three

such installations would cover all of offshore Newfoundland as shown by Figure 15. C-CORE is subcontracted by NRSL to provide the software development services, assembly of the equipment, commissioning and initial operation of the site. Meanwhile the major research thrust towards developing a groundwave radar system that will work from a rig and one that can be mounted on a ship continues as the main activity of the in-house C-CORE research group.

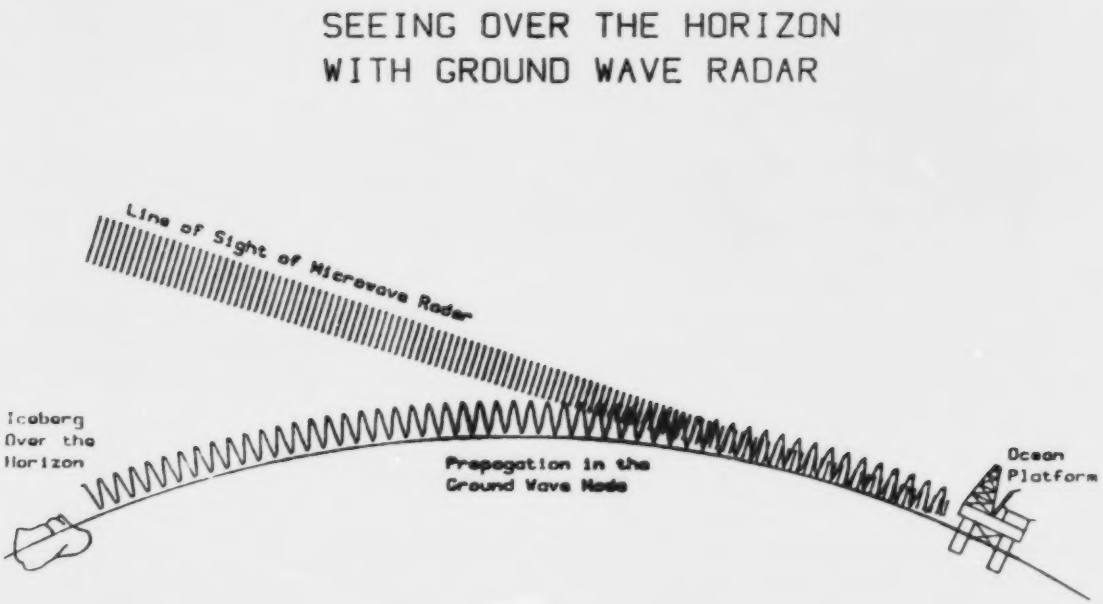


Figure 12
Conceptual representation of over-the-horizon detection of icebergs with groundwave radar

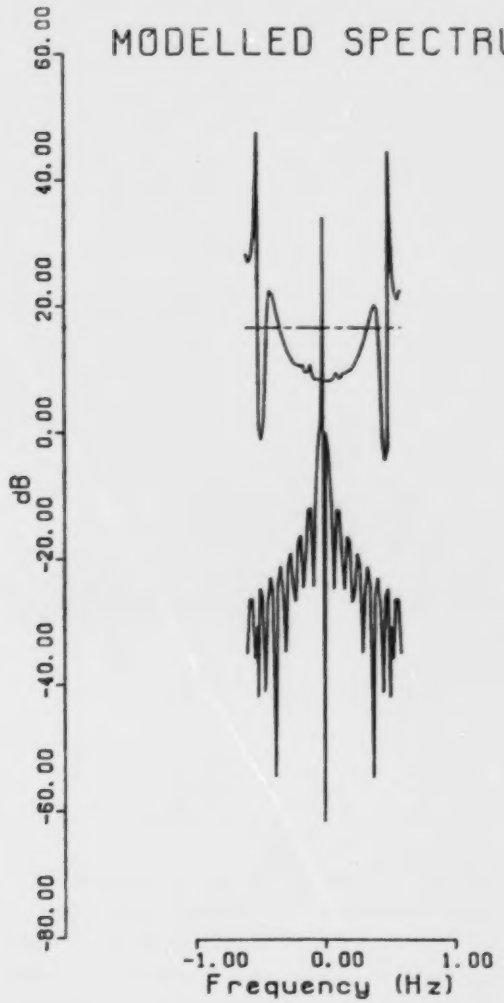


Figure 13
Modelled spectrum for iceberg detection
The spike at zero Doppler is predicted iceberg

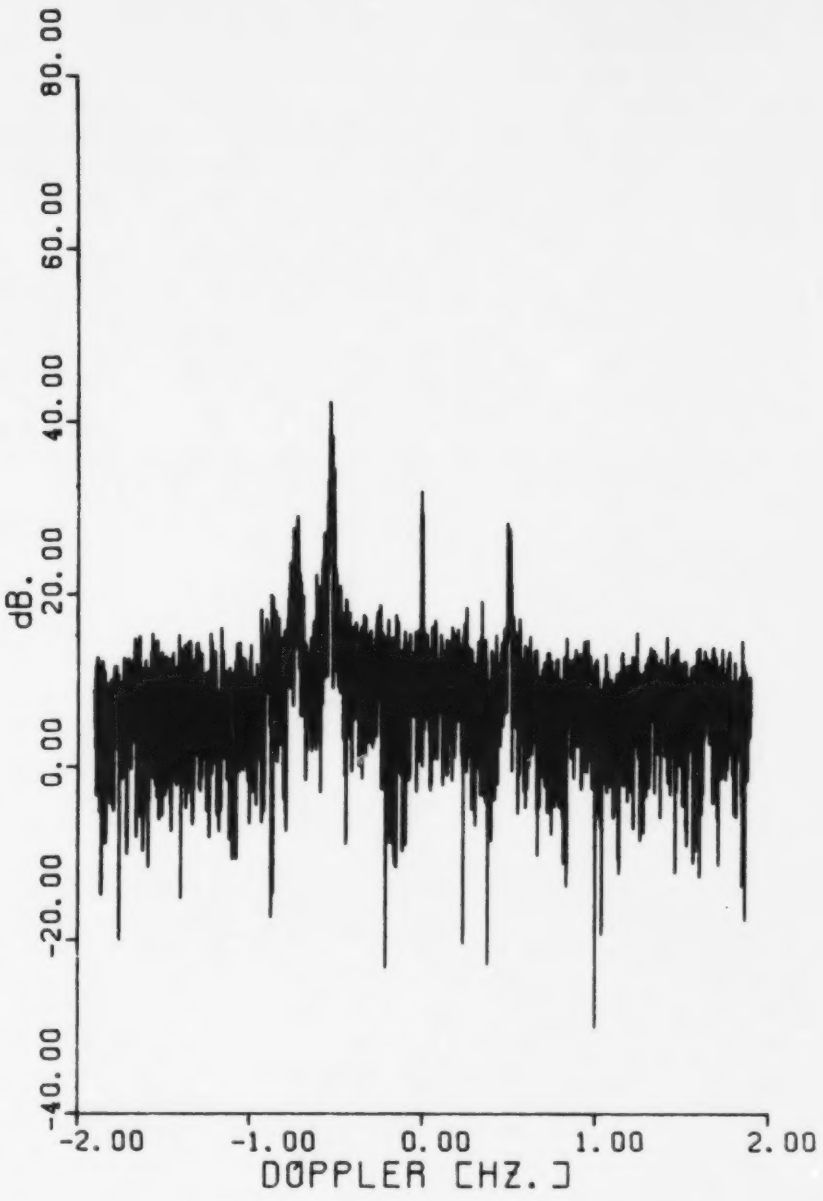


Figure 14
Actual groundwave return
The spike at zero Doppler is an iceberg

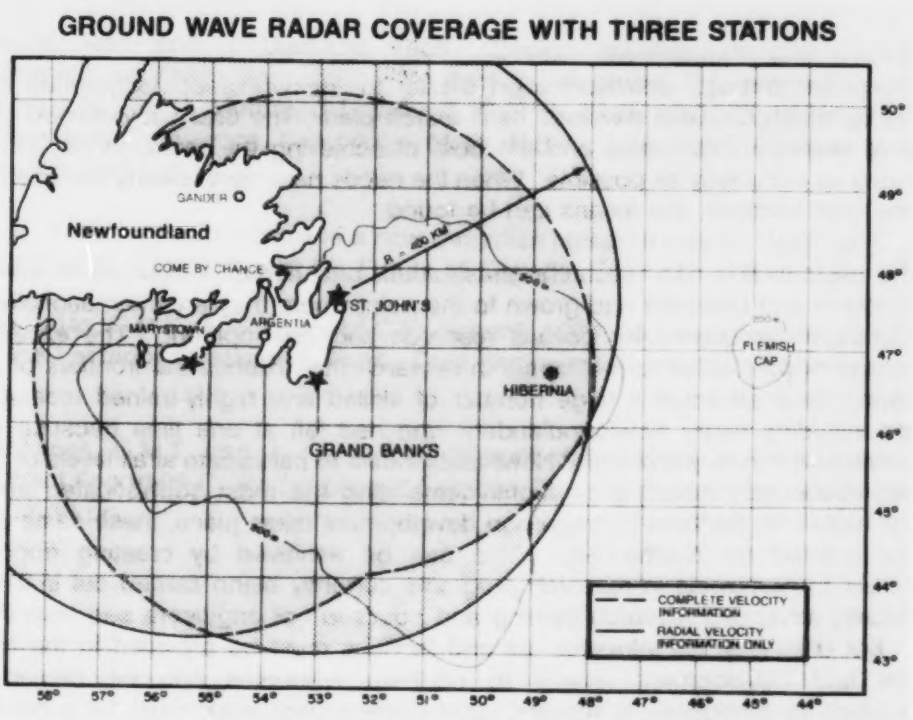


Figure 15
Groundwave radar coverage with three stations

DISCUSSION AND CONCLUSIONS

Although Canada can be shown to be investing less in research than other industrialized countries at the present time, as reflected by a comparison of GERD/GDP ratios, the situation has improved significantly in the past few years. We are closing the gap with some countries, keeping pace with others and slipping somewhat in relation to some. But the opportunities for research in Canada have never been better than they are now. At one time, most universities and government labs worked in isolation. Some still do but interfaces between the private sector, government and universities have developed significantly over the past few years. Most government labs now have close linkages with potential industry users and with university collaborators. Universities, while still maintaining their academic freedom and being the major source of discoveries from 'curiosity driven' research now have opportunities to move their research ahead at an accelerated pace when the timing is right by collaborating with affiliated research institutes such as C-CORE and with industry. All of this is part of what Dr. A.E. Pallister referred to as a new research culture (Pallister, 1986). The examples of C-CORE research, practically all of which is carried out with university, industry and government partners, is illustrative of the new research culture and is a demonstration of what can be achieved by cooperation. While some isolation may still exist in all three sectors, cooperative research is now the norm, facilitated by C-CORE-type organizations. The Ontario Centres of Excellence program requires such collaboration. The Federal Centres of Excellence program requires universities to work together and to work with government labs at both the federal and provincial level and with industries where common research interests are found. Needs are

being identified through communication similar to the workshop techniques and industry contacts by which C-CORE develops its research plan. The user sectors must participate in identifying needs and priorities and the cost of achieving the research objectives must be determined as accurately as possible. When the needs have been clearly identified and agreed to by the user sections, the means can be found.

Over the past decade, the research infrastructure and human resources in the province of Newfoundland and Labrador had grown to the point where they are internationally recognized as a Centre of Excellence for oceans research and development. The excellence of the facilities and opportunities to participate in research that extends the frontiers of science and engineering have attracted a large number of skilled and highly-trained researchers to the province including many Newfoundlanders who had left at one time because of a lack of opportunities. It is now possible for Newfoundlanders to participate at all levels of development of ocean resources, including positions demanding the most sophisticated and advanced research skills. As northern hydrocarbon development takes place, these same opportunities must be created for Northerners. This can be achieved by creating opportunities for Northerners to participate in research programs currently being carried out in the South and by providing advanced research training and education of engineers and scientists from the North. But ultimately the infrastructure and facilities must be provided in the North so that research and development related to northern resources can be carried out there. Opportunities to participate in research and development work must be provided to those whose lives will be most affected by the results of the work.

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5.3

TECHNOLOGY FOR OFFSHORE DEVELOPMENT: STRENGTHS AND WEAKNESSES

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EBA Engineering Consultants Ltd.

INTRODUCTION

This paper examines the Arctic offshore, particularly exploration for hydrocarbons below the Beaufort Sea. Canadian engineers have accumulated about 15 years of experience with design, construction, and operation of temporary drilling platforms that are required to assess the oil and gas potential of the area. This period has seen an evolution in engineering concepts for dealing with increasingly deeper water, an uncertain ice and wave environment and unfavourable seabed soils.

The development of environmental and geotechnical design criteria for the Beaufort has not come easily or without unexpected costs. Many important lessons have been learned. In keeping with the session theme "needs and means", some of the engineering lessons that have shaped our design processes will be discussed.

LOADS ON OFFSHORE STRUCTURES

All bottom-found exploration structures for year-round use in the Beaufort Sea fall under the broad category of gravity base structures. They require substantial mass in contact with the seabed to resist high lateral loads caused by moving ice. The magnitude and combination of design loads together with a shortage of local construction materials has bred a unique class of structure for the Arctic offshore.

Primary design loads on a typical structure are shown in Figure 1. Fortunately, the Beaufort Sea is not a seismically active area, therefore earthquake loading has had minimal influence on the design. A large lateral load from moving sea ice acting together with gravity loads determine the minimum footprint required on the seabed for overall stability against sliding or overturning.

ROLE OF THE GEOTECHNICAL ENGINEER

Geotechnical engineering has played a key role in the evolution of Beaufort structures. It is useful to examine this role within the context of a multi-discipline design team, as illustrated in Figure 2.

Ice and wave design criteria are obtained from an oceanographic specialist who is usually a self-taught expert on the Beaufort environment. An acceptable structure configuration evolves only after several iterations with the structural designer. The feedback process relies to a large extent on a design team that is knowledgeable about the construction process and cost

implications of various approaches that appear feasible. These may be structure related or fill related or both. The integrated team approach, shown in Figure 2, has resulted in design innovations that respond to regional environmental conditions and to a variety of conditions established by the owner's exploration drilling department.

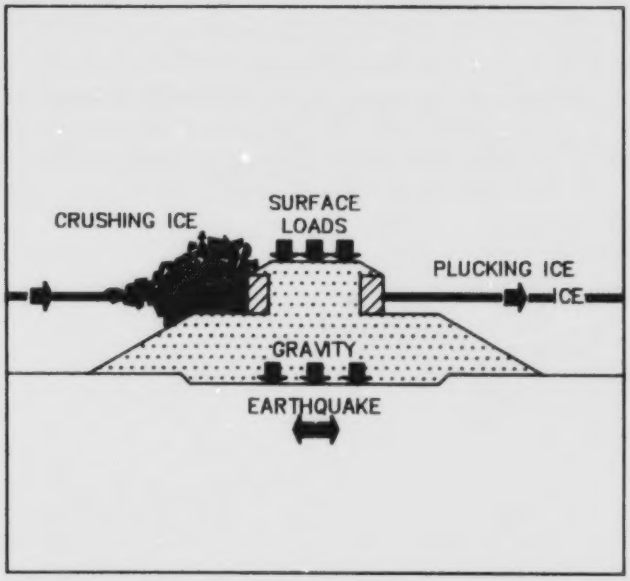

Figure 1
Loads on an offshore structure.

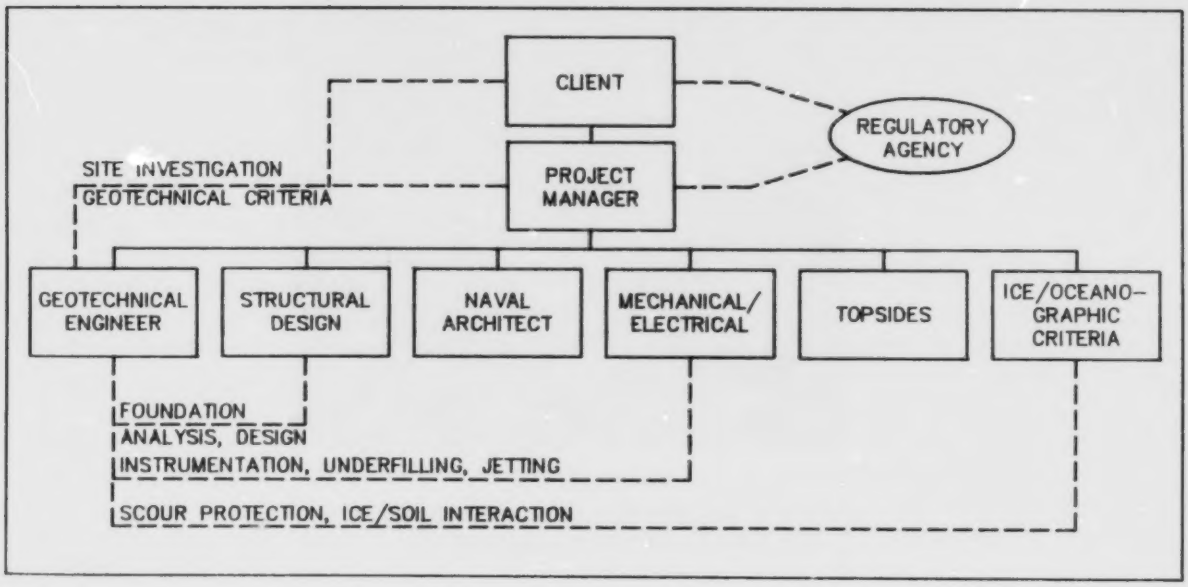

Figure 2
Role of a geotechnical engineer in a multi-discipline design team.

STRUCTURE TYPES AND FUNCTION

The types of structures used to date can be broadly grouped as either fill islands, retained fill islands, or structures on subsea berms.

Recent construction methods have used sand sucked from the seabed by large dredges and placed as hydraulic fill. Where suitable construction materials lie close to the site, a stationary cutter-suction dredge, such as the Beaver Mackenzie shown in Figure 3, is used. Material pumped from the seabed is delivered to the island site through a floating pipeline where it is allowed to discharge into the sea until the island breaks the surface. Deep water fill islands, such as Esso's Issungnak, located in 20 m of water, required 5 million cubic metres of fill to be placed over two summer construction seasons. Typical underwater sideslopes were 10 to 1 (H/V).

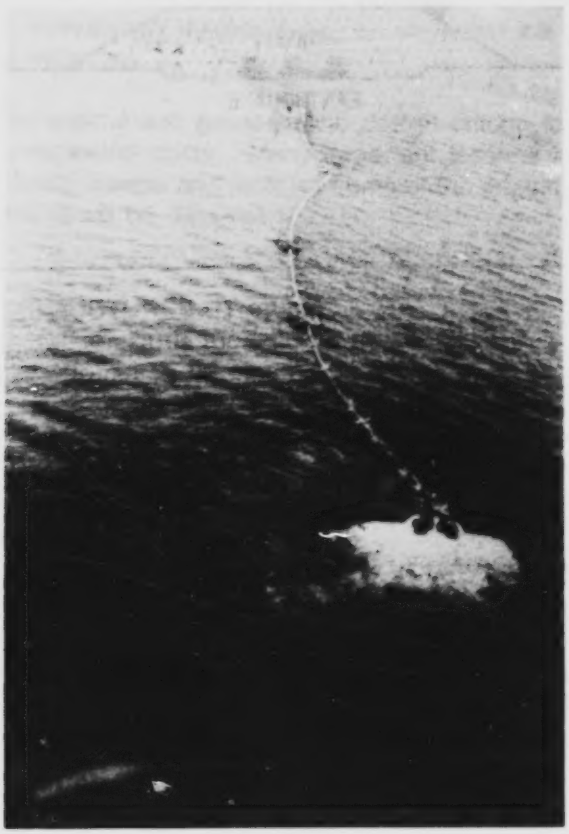

Figure 3
"Beaver Mackenzie" dredge
pumping sand through a floating pipeline.

Fill islands have proven to be more of a construction challenge than a design problem. Construction feasibility is usually controlled by the presence or absence of suitable fill materials within close proximity to the site. General guidelines have been developed for acceptability of silty sand that limits the proportion of silt allowed in the sand fill. These guidelines evolved empirically from observed satisfactory performance during previous construction.

Unfortunately not all sites have subsea borrow sources located nearby. Island construction at these sites requires barge transport of sand from a predefined borrow pit to the island location. Travel distances sometimes exceeded 100 km. This construction method bred a new marine construction fleet with world class stationary suction dredges such as the "Aquarius" shown loading a barge in Figure 4, and trailing suction-hopper dredges such as the Geopotes IX and X. These latter dredges could self-load, transport and discharge their cargo at the site. They were considered the motor scrapers of the sea.

Figure 4
Stationary dredge "Aquarius" loading
a barge at a borrow site.

A requirement to transport fill over long distances provided the motivation to reduce fill quantities by retaining it through the surf zone. A retaining structure of steel or concrete eliminates much of the fill required for the long underwater sideslopes as well as providing increased wave protection. The first retained fill structure was Dome's Tarsiut location, shown during construction in Figure 5. Four concrete caissons sitting on a subsea berm confined the fill through the surf zone. Water depth at this site was 22 m. Fill quantities were about one third of the requirement for "Issungnak", an unretained island located at similar depth.

Fill retention structures designed by other operators include Esso's Caisson Retained Island and Gulf's Molikpaq. These structures are attractive to the operators because they can be moved from site to site and reused. They also significantly reduced the risk of erosion damage from late season storms; a factor that has taken its toll during construction of unretained fill islands.

The widespread adoption of retained fill islands had a major impact on the importance and approach taken to geotechnical engineering. Instead of simply being part of a construction planning process, the structure design was now frequently constrained by site conditions. Fill retaining structures without long underwater sideslopes concentrate the loads on soft under-

lying seabed soils, significantly increasing the applied shear stress. This is compounded by a vertical sided structure through the ice zone which attracts greater horizontal ice loads while reducing the overall sliding resistance.

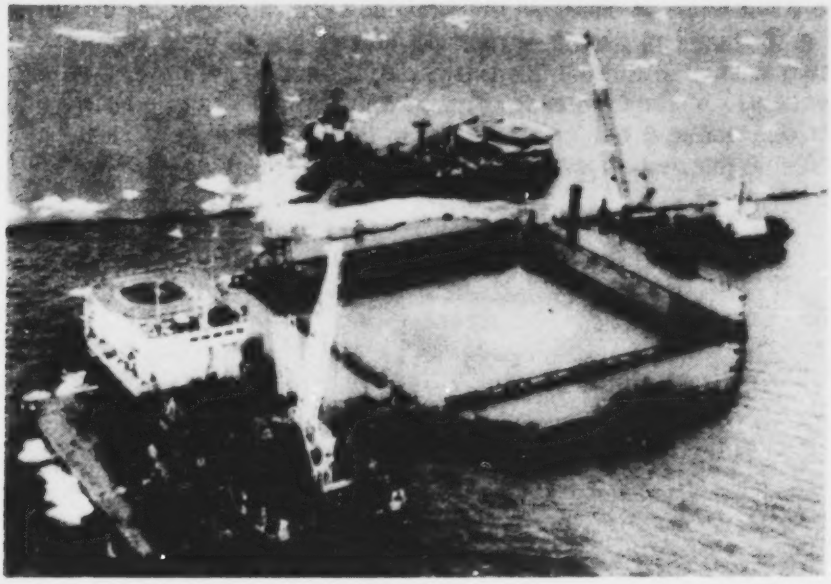

Figure 5
The first retained fill island
under construction at Tarsiut N-44.

A variation on the retained fill island was the use of a mobile structure sitting on a prepared subsea berm. The only structure of this type used in the Canadian Beaufort was Canmar's Single Steel Drilling Caisson (SSDC).

Fill retaining structures sitting on a subsea berm transmit the large horizontal ice load to the foundation soils in a complex manner. A portion of the load applied to the face of the steel or concrete is transmitted directly to the interior fill or core. The remaining load is carried through the structure to its base where it is distributed to the underlying berm by base friction. The proportion of load shared between structure base and core fill depends on relative stiffness of the soil-structure system.

Load transmitted to the core or berm generates a shear stress in the soil that must be within the soil's available strength with an appropriate factor of safety applied. The design must be checked by modelling the structure and soil together to determine response of the overall system to a specified ice load forcing function. The challenge facing both the structural designer and geotechnical engineer is selection of appropriate input parameters representative of the load-deformation characteristics of the structure and of the soil.

ENVIRONMENTAL CONDITIONS

Seabed Soils

The southern Beaufort Sea lies off the Mackenzie River Delta, one of the world's great deltas. The western half is a modern delta and the eastern half is an ancient delta of preglacial origin. Most prospective oil and gas fields straddle the transition between these two regions.

Almost 2000 shallow geotechnical boreholes have been drilled and many miles of shallow seismic lines have been run since the beginning of exploration in the early 70s. The data has been used as a basis for design of structures and to evaluate prospective sources of submarine sand for use as fill. A joint industry-government programme has made the data available to government geologists who have developed a synthesis of regional seabed conditions. This cooperative research has been of immense benefit to designers and to regulators. Maps dividing the area into geologic regions have been developed. Moreover, seabed anomalies such as shallow gas, gas hydrates and seabed permafrost have been mapped and explained.

Much of the Beaufort seabed is a typical deltaic sequence, with sand, silt and clay extending to great depths. The soils become finer grained further offshore. The softest clays, which present the most undesirable foundation conditions, occur offshore from the modern Mackenzie Delta in a region referred to as the "Mackenzie Trough". The name refers to the seemingly bottomless depth of "unconsolidated" silt and clay. In many cases the soils are too soft to support a structure, requiring subexcavation and replacement to a depth determined as part of the design process.

Permafrost is widespread in the seabed, particularly in the central and eastern regions. The top of ice bearing permafrost is highly variable ranging from 0 to greater than 20 m below seabed. The bottom of permafrost can be as deep as 500 to 600 m. The permafrost is a relic feature that formed in the sediments at a time when sea level was up to 100 m below current levels. Frozen ground penetrated deep into the subaerial sediments, driven by the periglacial climate that prevailed at the time. Much of the fresh water ground ice formed has been preserved after sea level recovered because seabed temperature is close to the freezing point of seawater (-1.8°C) most of the year.

Subsea permafrost has had limited impact on the design of short-lived exploration structures, however, it is certainly an important factor in the design and operation of subsea pipelines or production structures. Permafrost is of particular significance for design of permanent wells that will produce warm oil. A landmark geotechnical corehole was completed to a depth of 540 m by Gulf Canada Resources during last summer (1988). This project has provided the first factual data on deep subsea permafrost that is essential for casing design to accommodate potential downdrag loads from thawing permafrost.

Fill Materials

The selection and placement of fill materials for construction purposes has been an ongoing concern to geotechnical engineers. Marginal materials must be used because of the predominance of fine grained soils. Most fill sand is contaminated with finer grained silt or clay to some degree. The presence of "fines" has a significant undesirable affect on engineering

properties. The strength of granular fills is dependent on placement density with fills that are loose of a critical density subject to liquefaction failure. The critical density is dependent upon stress level and upon fines content of the fill. The placement density is dependent on construction procedure as the same fill will be more dense if it is dropped to the seabed from a bottom dump barge than if it is pumped to the seabed through a pipeline.

The sensitivity of structure performance to fill properties was demonstrated in 1983 during construction of a subsea berm at a site known as "Nerlerk". The berm sand liquefied five times during the construction process. Each time the sand flowed off the berm over the seabed. Computer plotted topography of a portion of the Nerlerk berm after a liquefaction slide is shown in Figure 6. The berm was abandoned after several attempts to rebuild it failed. The total cost of the failure is reputed to be in excess of 100 million dollars.

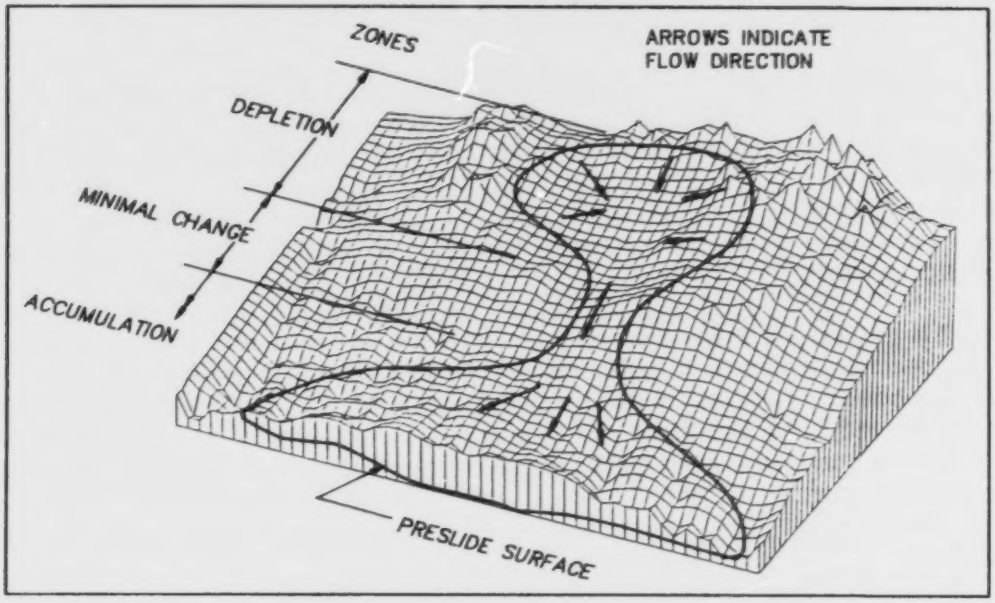

Figure 6
Liquefaction slide in fine sand
at Nerlerk subsea berm.

Soil liquefaction such as occurred at Nerlerk is the most serious form of geotechnical failure because of the rapid soil movement with little forewarning. This case history has had important implications on design of fill retention structures such as Gulf's Molikpaq. This structure derives its ice resistance from a sand core that can be relatively loose immediately after placement. There is not complete agreement among practicing engineers regarding appropriate design methodology or means of evaluating properties of hydraulically placed silty sand fill. Conflicting views are currently found in the technical literature, highlighting a need for ongoing research.

WAVE AND ICE ACTION

The months of September and October are particularly stormy in the Beaufort Sea as freezeup occurs. The storms invariably hit late in the construction season, at a time when slope protection may not be in place yet equipment is on the island. A number of unprotected fill islands have been damaged or partially destroyed by late season storms. The most spectacular was Esso's Minuk Island, shown in Figure 7, where the rig toppled into the sea. A storm of particularly long duration eroded much of the sand fill, undermining the rig. Such events do not pose a particular hazard to a properly designed long-term structure, however, they do expose the owner or contractor to a substantial risk of loss during the construction period.

Figure 7
Failure of Minuk Island by
erosion from a late season storm.

Substantial progress has been made toward understanding how ice forces develop and what mechanisms determine load magnitudes on offshore structures. Much of the design methodology has evolved from small and larger scale testing of sea ice. Ice load theories have been calibrated to varying degrees by observation and measurement of ice action against natural and artificial islands.

Established methods for developing design criteria for ice loads on structures is being reexamined following a major ice event in the Beaufort during the winter of 1985. The offshore structure "Molikpaq" was struck by a multi-year flow that caused ice crushing simultaneously

over its entire face. It has been reported that the load, which was back-analysed from monitoring instruments, exceeded the design total ice load. Some analysts concluded that the structure was on the verge of incipient failure.

The Molikpaq ice event has shown the complexity of ice-structure interaction. For the first time the dynamics of ice loading were observed and recorded. Moreover, the importance that small displacements of the structure play in the interaction scenario can now be more fully appreciated. The response of the structure which included partial liquefaction of the sand core, is the subject of ongoing research.

CONCLUSIONS

In conclusion, there is a need to capitalise on our collective experience such that others do not "reinvent the wheel". Costly lessons that have been learned from Nerlerk, Minuk and other failures point out the need for a more intense research effort, particularly directed at establishing design criteria. The major ice event experienced by the Molikpaq shows the value of performance monitoring. These activities must be supported and upgraded as we move toward production from the Beaufort region in the 1990s.

5.4

CAPITAL COST RE-ESTIMATE FOR THE ALASKA NATURAL GAS TRANSPORTATION SYSTEM

John K. Burrell
Vice-President, Operations
Foothills Pipe Lines (Yukon) Ltd.

INTRODUCTION

Foothills Pipe Lines (Yukon) Ltd. and Alaskan Northwest Natural Gas Transportation Company, the Canadian and United States sponsors respectively of the Alaskan Natural Gas Transportation System (ANGTS), have recently completed a capital cost re-estimate of the Project and found

- Project costs are significantly reduced from that of the previous estimate,
- the Project can be operational in the mid to late 1990s delivering needed Alaskan gas to the lower 48 states at a market clearing price.

In this paper I will be discussing Project background, current status, and an approach followed in developing the re-estimate and items of major cost reductions. However, the primary focus will be on the information gained from our extensive field testing and experimentation, how it was used to better define the Project and in turn contributed to the reduction in the capital cost estimate.

ANGTS PROJECT DESCRIPTION AND BACKGROUND

Phase I (Prebuild System)

- became operational in the early 1980s to deliver Canadian gas to U.S. markets in advance of the transportation of Alaskan natural gas
- represents completion of approximately 1/3 of ANGTS
- current firm delivery capacity is approximately 1.3 BCFD
- system has been near capacity since last November

Phase II

- portion of ANGTS from Prudhoe Bay, Alaska to Caroline, Alberta
- approximately 2100 miles, plus facilities south of Caroline as required

Phase III

- Dempster Lateral for the transportation of Mackenzie Delta gas to Whitehorse for injection into the main line

PROJECT STATUS

Project has been subjected to extensive regulatory and environmental review. ANGTS is approved in both Canada and U.S. to transport Alaskan North Slope gas to markets in the U.S. lower 48 states. Legislation including:

U.S. Alaska Natural Gas Transportation Act	1976
U.S. Federal Power Commission Recommendation	1977
National Energy Board Reasons for Decision	1977
Canada/U.S. Agreement on Principles	1977
U.S. Presidential Decision Ratified by Congress	1977
Northern Pipeline Act	1978
U.S. Waiver of Law	1981

is in place in both countries which provides for expeditious construction of the Project.

Right of Way

- granted over federal lands of Alaska
- granted in Yukon
- land reservations in both B.C. and Alberta

Routing, Project design and approach to construction are now well defined and a substantial portion of detailed engineering design is already completed.

There is over seven years of operating experience with the Prebuild portion of the Project and an operating company is in place. Phase II of the Project was put "on hold" in the early 1980s due to gas supply and price conditions (the gas bubble and falling prices.) General feeling now in the U.S. is that the "bubble" will disappear in 1-2 years resulting in a growing need for additional gas supply. In addition, natural gas should be able to capture an increasing share of the U.S. energy market, given the increasing environmental sensitivity to the so-called greenhouse effect and concerns with nuclear power.

North Slope of Alaska represents the United States' largest untapped source of proven gas reserves (some 30 TCF), capable of displacing 400,000 to 600,000 bpd of imported oil. ANGTS Project is in advanced stage of readiness and can be completed in a most expeditious timeframe.

PROJECT RE-ESTIMATE

General

Project sponsors have recognized for some time that the previous ANGTS cost estimate was high because

- previous estimate was prepared in 1982 but based on a late 1970s design,
- significant developments have occurred in the last 10 years affecting Project capital costs,
- changed economic circumstances, and
- expanded design and construction information base.

In 1987 sponsors concluded it was timely to perform an in-depth re-estimate of the Project capital cost. To realize continuity of approach across the Project, Foothills worked closely with Alaskan Northwest in developing the overall cost re-estimate.

Although the following comments relate to the Canadian portion of ANGTS, the portion for which Foothills is responsible, most of the reasons for reduction in the capital cost estimate cited in this presentation also apply to the Alaskan segment. The re-estimate is an in-depth "bid" quality estimate and required over 10 months to complete and was developed by construction personnel with extensive northern experience.

Approach

All the 1982 estimate assumptions were reviewed and updated. A "bottom up" estimate was made. All crew sizes and equipment requirements were assessed for each construction activity. This incorporated:

- current material costs, labour and equipment rates,
- advancements in pipeline design and technology since the late 1970s,
- increased baseline information (e.g. approximately 1000 drill holes along routing in Yukon),
- information gained from extensive full scale field test sites,
- confirmation of Project design,
- acceptability of conventional methods of construction in permafrost regions

and also reflects:

- the current northern transportation and communications infrastructure,
- Project environmental and socio-economic requirements,
- current forecast of economic parameters for as-spent costs.

The re-estimate was reviewed by an independent contractor having extensive northern experience who concluded the approach followed in preparing the estimate is both realistic and sound.

CONCLUSION

Foothills and Alaskan Northwest are satisfied that the new estimate realistically represents the capital cost of the ANGTS Project.

This re-estimate was prepared by experienced construction people with extensive information available to them, particularly field gathered data and probably more information than any project would have, other than one actually completed.

One of the main factors which I believe becomes clear through this re-estimating process is the reduction in project uncertainty, and thus the credibility which can be given to a project estimate whose design and method of construction is supported by appropriate field data, and when desirable, the results from full scale field testing.

5.5 SCIENCE, TECHNOLOGY AND INFORMATION

Report of Working Group
chaired by

K.R. Croasdale
Frontier and Environment Section
Esso Resources Canada Ltd.

About twenty people attended this session; there was a good range of representation, including people from industry, government, consultants and universities. The following is a summary of the discussion (prepared by the Chairperson based on the recorded transcript).

CHAIRPERSON'S OPENING REMARKS

This session is convened to discuss issues relating to the role of science, technology and information in northern hydrocarbon development. This session also combines industrial benefits, which was originally planned to be a separate session.

In considering the role of science and technology in northern development it is perhaps appropriate to remind ourselves of the issues which make northern operations different from those in the South. These can, I believe, be itemized as follows:

Harsh environment: Extreme cold and darkness in the winter months inhibit operations, and lead to engineering problems associated with permafrost and offshore ice.

Fragile environment: Northern environments do not renew themselves as quickly as in the South and this leads to a greater concern about environmental protection and disturbance.

Distance to markets: Northern hydrocarbons have to be transported further to the consumers.

More costly: All of the above differences between North and South add up to more costly development of hydrocarbons.

Within the context of the above differences, we can now ask ourselves what is an appropriate role for science and technology in northern development? In general, this role can be described as being in two parts:

(1) Understanding the environment,

(2) Developing technology for exploration, production and transportation of hydrocarbons which is safe, environmentally sound, and cost effective.

With respect to the above role it is perhaps appropriate to ask:

- where are we at?
- what are the remaining challenges?
- what are the best approaches to addressing the remaining challenges?

This conference takes place at a time when considerable activity has already taken place in exploring for northern and frontier hydrocarbons. For example, during the past two decades about 370 offshore wells have been drilled in Canada. Of these, 80 have been in the offshore Beaufort (in water depth out to 67 metres), and about 30 wells have been drilled offshore in the high Arctic (in water depths to 500 metres). As we have already heard during the course of this conference, offshore drilling in Canada's Arctic has required completely new technology to cope with offshore ice. In this regard Canada has been a world leader in conducting research and developing technology for Arctic offshore operations. The technology developed for exploration can be applied to production of hydrocarbons, although significant challenges do remain.

As we all know, whether or not northern hydrocarbons get developed will depend on favourable economics. Simply put, the economics of hydrocarbon development depend on the size of the hydrocarbon deposit, the price, and the cost of extraction and delivery. The first two factors are beyond our control. However, the third is certainly one which can be influenced by new technology.

In fact, I believe the challenge for science and technology within the context of northern hydrocarbon development is quite clear. It is to develop new technology aimed at lowering costs yet continuing to maintain safety and environmental protection.

Of course, it is one thing to define the challenge for science and technology, it is another to see clearly how this challenge can be met; perhaps this can be one of the points of discussion for this working group. In my view, some of the challenges can be listed as follows:

- What are the relative roles of industry, government and universities (and northern involvement) in addressing the science and technology challenges?

- How can we ensure continuity of funding for research in periods of low oil prices and inactivity?

- How can we preserve previously generated knowledge and experience, and make best use of it? (This gets into the topic of information management which is also one of the topics of this session.)

- How can we preserve and further develop people skills in the area of northern science and technology?

- How can we further encourage innovation and its acceptance in northern projects?

- How can we effectively exert leverage in the area of international cooperation, at the same time maximizing Canadian industrial benefits?

- Finally, how can we best cooperate nationally in order to ensure effective use of research resources?

With this overview of how I perceive some of the issues relating to science, technology and information, I would now like to encourage comments and discussion.

NOTE

The following is a summary of points of discussion as edited by the Chairperson; in some cases the speaker could not be identified from the transcript.

Brian O'Donnell emphasized the importance of information management in effectively using available data and research results. He wanted to encourage this working group session not to let this issue slip.

Michael Jarvis suggested that there was a close connection between science and technology and industrial benefits; the challenge being to maximize industrial benefits which can result from new technology.

Owen Hughes pointed out that a new factor in northern technology development was climate change, and that anticipating climate change might lead to different technological solutions than currently envisaged.

Louis Rey made a presentation on the potential role of submarine technology in offshore and northern hydrocarbon development. Following Dr. Rey's presentation, Jim Hea remarked on the need for this kind of submarine technology if the deeper water resources in the high Arctic are to be exploited. Also, that access to an offshore wellhead was very desirable from a point of view of safety and environmental protection. A comment from the Chairman questioned the economics of submarines for production, as this had previously been looked at and found to be too expensive. In response, it was emphasized that the primary use of the submarines in Dr. Rey's presentation was not for transportation but access to subsea equipment; although some small level of transportation of oil could be achieved (i.e., an oil carrier has been designed with a capacity of 35,000 m^3).

In the context of transportation, Hugh Sangster offered some comments on northern pipelines. First he suggested that from the Beaufort, a pipeline mode of oil and gas transportation was much more likely than tankers. Pipelines are proven technology and cost-effective. For example, currently a million and a half barrels of oil per day are transported from western to eastern Canada at a tariff of $1.24 per barrel. Also, the Norman Wells pipeline has been very successful and incorporates state-of-art design for pipelining through discontinuous permafrost. He suggested that pipelines to the Beaufort are feasible, despite additional challenges relating to the terrain and the environment. Bigger challenges remain in moving offshore in the Beaufort in relation to ice scour and permafrost. We need to encourage additional research in these areas in order to develop innovative solutions.

At this point, Michael Jarvis introduced the topic of industrial benefits, suggesting that the challenges were how Canada could benefit industrially from knowledge and know-how gained in northern operations, and how Canada's industry could be fully involved in northern development. He cited examples of how other nations have lined-up to get access to Canada's know-how, e.g., the Japanese, which we have given freely. As a result, when operators went out to get caisson structures built for Beaufort operations, all the construction contracts went to the Japanese.

Much discussion then took place on this issue. It was recognized that in steel construction the Asian fabricators were usually less costly. Therefore, in terms of cost-effective development, the operators would naturally tend to go offshore for fabrication, even though the know-how in terms of design might reside in Canada. The example of Norway was cited in relation to concrete structures and Norway's success in developing the technology and fabrication activities in Norway. Kaare Senneset suggested that this had been achieved by creating consortia within Norwegian industry that could tackle these large projects, but also in committing to the use of new technology in the form of concrete structures.

Further discussion took place on how Canada could emulate Norway's success but the difficulty of lack of continuity of major Arctic projects was recognized as a problem.

The session switched at this point to address the issue of information and Ross Goodwin from the Arctic Institute outlined the information systems such as the Arctic Science and Technology Information System (ASTIS) that the Institute has developed.

A discussion followed which addressed the issue of geotechnical borehole data and other "grey" literature which has been accumulated but is not easily accessed. This creates a situation where work can be repeated because of lack of knowledge of existing data. Also, the issue of linkage to foreign information services was recognized, and one which would be addressed in the Canadian Polar Science Information System. Other points of discussion included the need to catalogue research projects, and whether a directory of Canadian polar experts should be developed. Finally, Ross Goodwin expressed the hope that the creation of the Canadian Polar Information Centre would be supported by the attendees at this meeting.

At this point the Chairperson expressed thanks to all attending this working group session, and noted that not all issues had been covered, but he felt that a useful exchange of ideas had taken place.

Reference:

Minion, R. and Goodwin, R. (1988): "Questions and Answers about a Canadian Polar Information Centre", available from the Arctic Institute of North America, University of Calgary, Alberta.

5.6 CLIMATE CHANGE AND ITS POTENTIAL IMPACT ON THE FUTURE OF NORTHERN HYDROCARBON DEVELOPMENT

Brian J. O'Donnell
Director, Western Region
Atmospheric Environment Service
Environment Canada

INTRODUCTION

I am pleased to have this opportunity to speak to you about global climate change and its potential implications for northern hydrocarbon development in the 1990s. I find it fitting to speak in this session on International Dimensions since the solution to climate change must involve all countries. It is a privilege for me to speak after Mr. Vetlesen of Norway - a country whose Prime Minister has provided leadership not only to Norway, but to the world in addressing the important linkages between development and environmental concerns. Madame Brundtland chaired the World Commission on Environment and Development and their report, entitled Our Common Future, challenged world political and economic leaders to recognize that our present environment and development policies cannot be allowed to continue as they threaten the resource base on which we all depend. Our own Prime Minister recently announced at the United Nations, that as part of Canada's response to the Brundtland Commission, the government will establish a Centre for Sustainable Development in Winnipeg, Manitoba.

So why should you be concerned about climate change? That's one of the questions I hope to answer today. I plan to answer by telling you: first, what is known today about our changing atmosphere and its impacts on our climate; second, what we don't know - the uncertainties or knowledge gaps about climate change (ten years ago the word was that of another ice age being foretold - today it's the greenhouse and warming - where's the credibility - what's the truth?); third, I will discuss what the potential impacts will be on future northern hydrocarbon development, and finally, I will tell you how you can get involved to keep up to date on information, to influence future policies, and possibly even to influence our future climate!

I will begin by making the bold assumption that everyone in this room knows about the greenhouse effect - since it has been written up as a feature article in almost every popular magazine in North America. I also don't need to tell you that the primary gas responsible for the greenhouse effect is carbon dioxide and that 80% of the world's CO_2 releases come from the burning of fossil fuels. Given these facts, the world leaders at the recent Toronto Conference on our Changing Atmosphere have called for a 20% reduction of global CO_2 emissions in less than 2 decades.

Without further elaboration, I hope you now know why I think climate change must be a part of your planning criteria for northern hydrocarbon development in the 90s.

KNOWN FACTS

What we do know, as Figure 1 illustrates, is that the concentrations of carbon dioxide in our atmosphere have been increasing steadily over the past 100 years and, more dramatically, they have soared 10% over the past 30 years alone. Other greenhouse gasses are also on the increase, methane, nitrous oxides and chlorofluorocarbons which, taken together, contribute on a 50-50 basis with carbon dioxide. All have shown measurable increases in global concentrations.

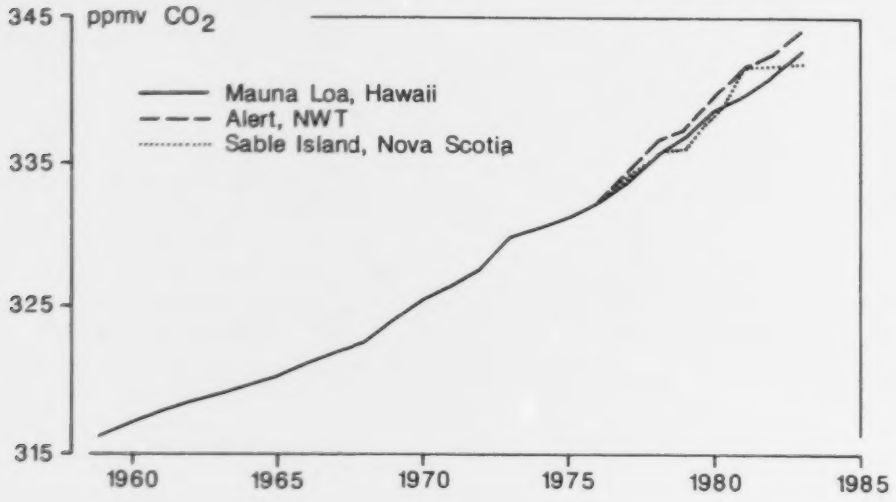

Figure 1

Global temperature trends clearly indicate (Figure 2, taken from Hansen) that a warming of 0.6 to 0.7°C has already taken place over the past century. The four warmest years over that time period have occurred in the 1980s. Further, the rate of warming over the last two decades is unprecedented over the 150 years of instrumental data records.

It is recognized that while these global temperature trends are still within the realms or envelope of natural climate variability, they are also consistent with model predictions of future warming scenarios. Furthermore, climate change will not be a monotonic trend upward but, as the models suggest, it will manifest itself with increased frequencies of warm episodes and more frequent occurrences of extreme events such as droughts, hurricanes, etc.

THE MODELS

There are several and they are somewhat analogous to political polls, that is, there are many types, certainly some are more conservative than others. They are very dependent on the initial assumptions (or questions asked), and finally the choice of model used to derive the results. The outcome is, in large, a measure of uncertainty. I am not here to convince you that the scientific community is absolutely sure of themselves, but rather that there is now a

near-consensus on certain broad conclusions and that these conclusions are, in the words of Dr. Kenneth Hare, internationally renowned Canadian climatologist that "the conclusions are firm enough to alert decision-makers" - in other words, to raise, in effect, the yellow caution flag as we race, driven by new technologies into an uncertain future. Further, he noted that "these results while clouded in uncertainty, are at least as firm as those of macro economic and econometric analyses".

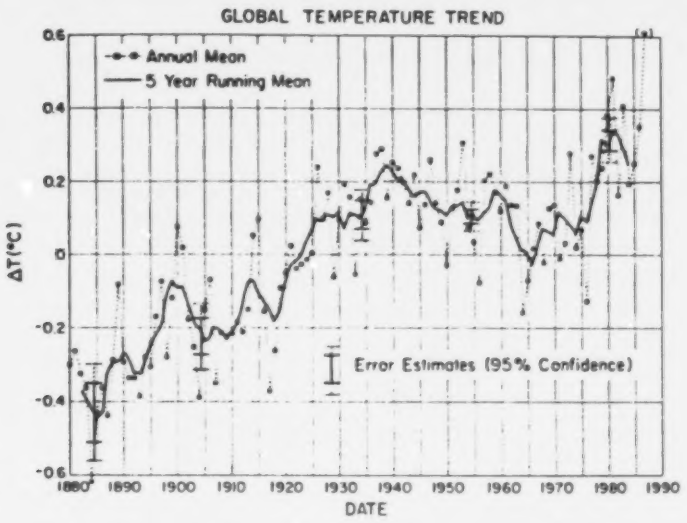

Figure 2

TRENDS

The combined effects of the projected increase of the greenhouse gasses as a result of human activities will be the equivalent of a carbon dioxide doubling by the 2030s i.e., within 40 years (Figure 3). Such a doubling may induce a global surface temperature increase of between 1.5°C and 4.0°C according to the existing atmosphere - ocean models. The possible range of model scenarios is depicted in Figure 3. In the professional judgement of the world experts who met in Villach in 1985, "there is a 90% chance that the actual future pattern of greenhouse gas-induced climate change will lie within the bounds set by the upper and lower curves". The major uncertainty lies in the degree of change and the rate of change.

Furthermore, the models agree that this warming is likely to be geographically non-uniform. High latitudes will warm the most - especially during the winter season. Figure 4 shows one such model. In Canada the model suggests a warming of the Arctic winter of between 6 - 16°C and summer warming of 2 - 4°C. In addition, precipitation amounts may increase by up to 50% in winter months. This will mean a shorter duration and lesser extent of ice cover in Arctic waters, shorter but more intense periods of snow cover, and gradual degradation of permafrost.

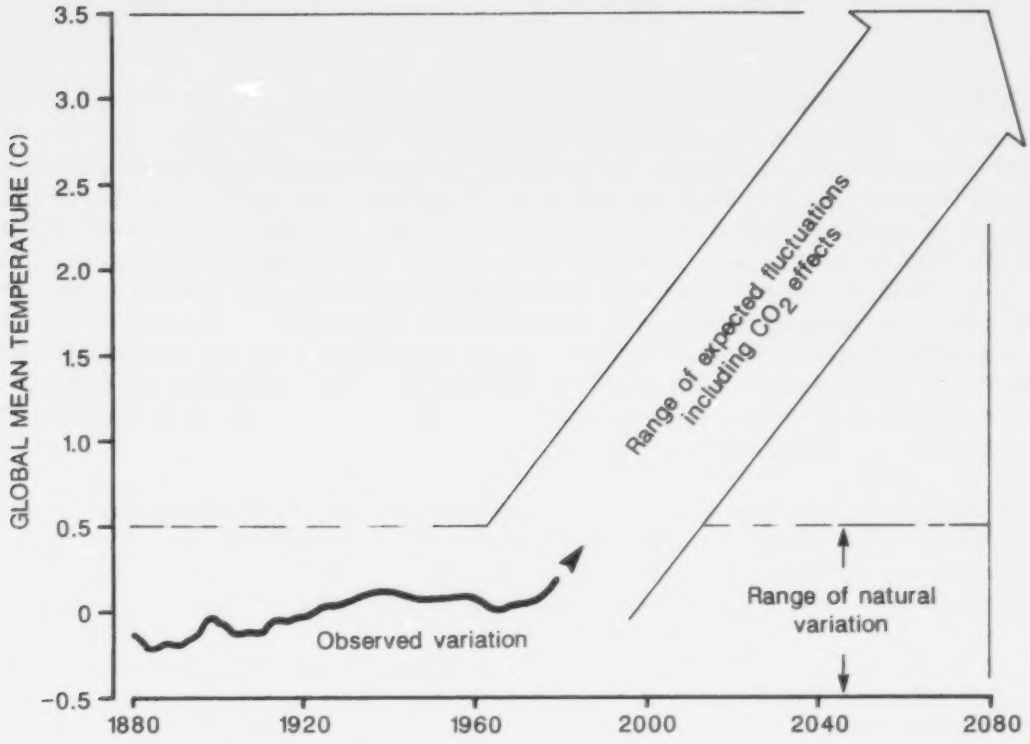

Figure 3

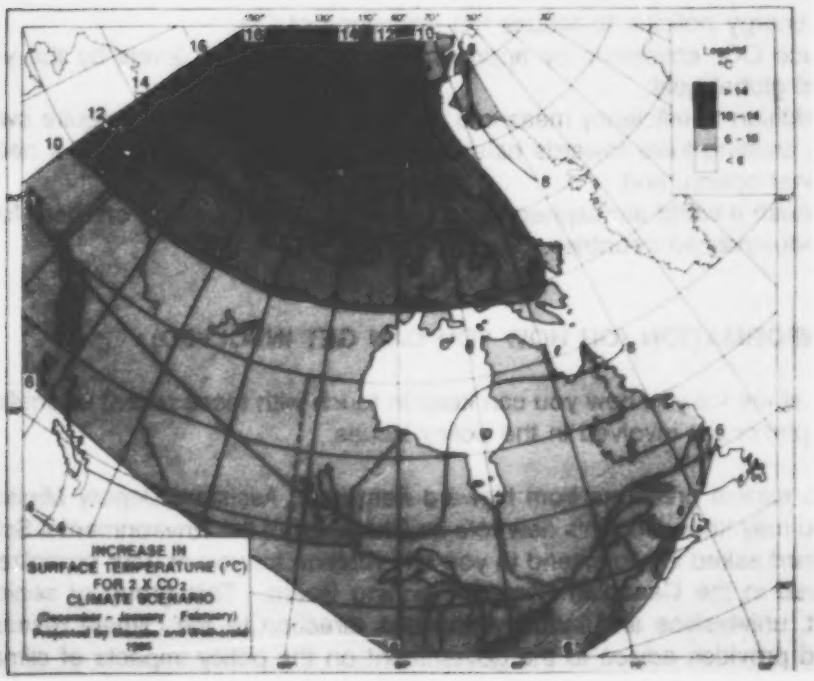

Figure 4

IMPACTS ON HYDROCARBON DEVELOPMENT PLANNING

If these predictions do manifest themselves, I am sure you'd agree the potential impacts would be significant, for example, the Bent Horn area where stable ice platforms are being used for drilling, on pipelines sitting on permafrost, and on future shipping if the Parry Channel was suddenly opened year round. The conclusion of the first Climate Conference in Villach in 1985 was, **"Many important economic and social decisions are being made today on long term energy projects all based on the assumption that past climate data are a reliable guide to the future. This is no longer a good assumption in view of the greenhouse evidence."** Therefore the first impact on your planning for future operations is that your engineering plans will require to be adapted to the new emerging trends and models. That's one aspect - the scientific one.

Permit me now to speculate a bit beyond my expertise - to look at future global demand for hydrocarbons given firstly the changing climate with an overall warming - the impacts on demand may be significant. While heating oil requirements may decline, air conditioning needs will increase, one thing is for sure, given the scenario, the demand, as we know, will change.

Further, let me now talk a bit about the politics and public reaction to global climate warming. This past summer's (1988) droughts on the prairies and plains states, the extensive heat spell in the populated eastern centres and the recent ferocity of Hurricane Gilbert, all have fuelled public awareness to our changing climate. Scientific and public policy conferences such as the Toronto Conference on the Changing Atmosphere have elevated the awareness, concern and commitment of governments to the issue. Let me quote the main elements of the recommended action plan from that conference:

- Set energy policies to reduce the emissions of CO_2 ;
- reduce CO_2 emissions by approximately 20% of 1988 levels by the year 2005 as an initial global goal;
- in addition to efficiency measures the desired reductions will require switching to lower CO_2 emitting fuels towards natural gas and away from coal, and a need to renew the nuclear option, and
- establish a world atmosphere fund financed in part by a levy on fossil fuel consumption of industrialized countries.

FUTURE INFORMATION (OR HOW YOU CAN GET INVOLVED)

Just briefly let me tell you how you can keep in touch with these recent scientific developments and/or get personally involved in the policy issues.

First, let me extend greetings from Howard Ferguson, Assistant Deputy Minister of AES who many of you may know from his new role as Chairman of the Environmental Science Research Fund. Howard asked me to extend to you an invitation for you or your organization to become more involved in the Canadian Climate Planning Board. This group of senior officials from government, universities and industry provides direction to the climate research program in Canada and provides advice to the government on the policy impacts of climate change.

Another opportunity for your involvement is the new round tables on environment/economy being set up in each province. It's no accident that in Ontario the Minister of Finance is being recommended to head up that province's round table. I know that Ian Smyth from the Canadian Petroleum Association has been involved in the recommendations for the formation of these round tables; in general the CPA is an active member of this work and may, as such, be a good contact for you.

Finally, Environment Canada and the Department of Energy, Mines and Resources Canada, have departmental research and information publications - such as our Climate Digest series - which can be a continuing source of information to help you integrate climate change impacts into your future plans.

CHAPTER 6

ENVIRONMENTAL ISSUES AND THEIR REGULATION

6.1

ENVIRONMENTAL ISSUES AND THEIR REGULATION: INTRODUCTION

Patrick J.B. Duffy
Consultant
P.J.B. Duffy and Associates Ltd.

Development in the 1990s in the North will be influenced by important global and national developments. We have heard reference to Our Common Future and the Report of the National Task Force on Environment and Economy. These two publications are available and I would like to mention that if you have not read them you may be part of the problem! Many people feel that Our Common Future is arguably the most important document of our generation. It points to global change which can be translated into regional and local situations and sounds a very sobering note in terms of how we are managing resources and the environment. The Canadian reaction to this report can be found in the Report of the National Task Force on Environment and Economy.

There is another document called the World Conservation Strategy which was published in 1980 by the United Nations Environment Program, World Wildlife Fund and the so-called International Union for the Conservation of Nature. If some of these names are not familiar to you, let me offer the view that this document is equaliy important as the other two because it raised the same concepts and recommendations in 1980.

The main concept that you are going to find running through them is that of sustainable development. And, I would submit that in the next round of development in the North, that the new generation, the people who are in graduate schools today and who will be involved in development in the North, will regard this as their guiding literature.

Just a note about where this report impacted with regard to the North. The Brundtland Commission did not travel to the United States to hold public hearings, which resulted in American intervenors who wanted to meet the Commission coming to Canada to make their interventions. What does this mean in dealing with our staff and our contacts? It means that when dealing with people in American industry, academia and public groups, you might find a lesser level of understanding but not necessarily appreciation, of where this report came from and how important it is. I am mentioning this because, typically, when we work in the North, we are dealing with a mix of Canadian and American philosophy and knowledge.

On another matter, we have observed several times that there has been an exodus of expertise from the North during the hiatus in development which has taken place over the last few years. In the early 80s scores of experienced scientists and engineers, political leaders and bureaucrats moved to other jobs, retired, or sought other means of livelihood. It has been noted by Ewan Cotterill and others in Yellowknife that there is going to be a re-education to permit us to enjoy continuity from all the work that went on in the early 60s, 70s and 80s and into the 90s. The following presentations will address these themes and others relevant to regulation of environmental issues.

6.2 ENVIRONMENTAL ISSUES AND THEIR REGULATION: INDUSTRY VIEW

Evan Birchard
Beaufort Development Planning Manager
Esso Resources Canada Ltd.

PAST EXPERIENCE

The past is a good place to learn about the future and through the 1970s, we were, I believe, guilty of reducing issues to the lowest common denominator and studying them in isolation. As well, the phenomenon of "accelerated" base line data collection during that period resulted in research and development funds not always being spent in the most effective manner. Indeed, the massive EIA/SEIA efforts of this period are limited in value. Also, it must be remembered that northern environmental standards and guidelines were few in number and were, for the most part, adopted from experiences in the South. However, many of the people involved in such projects have learned a tremendous amount and are in a better position today to assess northern development.

PRESENT SITUATION

The industry has matured and has an increased understanding of, and sensitivity to, environmental and social needs. There is also increasing integration of environmental, public and employee health and safety and societal issues to the point where it is becoming difficult to separate the sciences. From a process standpoint we have improved our ability to identify those issues which are most important and concentrate our efforts and research and development funds on them. The value of local and public involvement in identification and resolution of such issues is also recognized. Governments are more knowledgeable regarding resource management and a certain amount of industry tie-in is desirable in this process. Certainly, there are more applied government research and development programs. The increasing emphasis on land use planning is also welcome.

FUTURE CHALLENGES

The greatest challenge facing the industry is to build environmental decision-making into our base business to improve economic and environmental integration planning. Also, we need to better use the available tools, such as formal risk assessment, environmental and health audits and monitoring and feedback into other similar projects. We also have the challenge of dealing with not only local and regional issues, but also matters which impact both nationally and internationally. We can also improve consultation and mediation processes which are best kept on an informal basis. Finally, regulatory development beyond the minimum requirements should be developed on performance-based standards.

6.3 ENVIRONMENTAL ISSUES AND THEIR REGULATION:
YUKON TERRITORIAL VIEW

W.J. Klassen
Deputy Minister
Department of Renewable Resources
Government of the Yukon Territory

The signing on September 22, 1988 of a Yukon agreement-in-principle on the Northern Energy Accord by the Yukon Government Leader, Tony Penikett, and Indian Affairs and Northern Development Minister, Bill McKnight, emphasizes the involvement the Yukon territorial government will have in northern hydrocarbon development in the 1990s. This agreement-in-principle will lead to a Northern Accord respecting oil and gas management and revenues. The principles agreed to provide for

"i) the phased transfer to the territorial government of legislative responsibility for managing and regulating onshore oil and gas resources;

ii) immediate consultation with the territorial government on all significant decisions affecting oil and gas in the Yukon and Beaufort Sea;

iii) a commitment to future sharing between the federal and territorial government of the regulation and management of offshore northern oil and gas resources in the Beaufort Sea; and,

iv) the sharing of oil and gas revenues."

The Energy Accord will be consistent with the sub-agreement in the Yukon Land Claims which deals with resource royalty sharing. The Accord should also provide the petroleum industry with administrative regimes which are stable and fair both onshore and offshore.

These recent events will provide additional incentive to the Yukon territorial government and residents of the Yukon for active involvement in hydrocarbon development. While the Yukon government, together with the federal and Northwest Territories governments and northern native groups, expressed concern about proposed exploration and full development of the hydrocarbon potential of the Arctic National Wildlife Refuge on the North Slope of Alaska because of the predicted reduction in the size of the international porcupine caribou herd resulting from such activity, the Yukon government has taken a position promoting sustainable development in the Yukon. This is set out in the Yukon Economic Strategy, a document resulting from extensive public consultation throughout the Territory. To meet the goals of this Strategy, the Yukon government will, among other things:

> "Support development of a full range of natural resources, both renewable and non-renewable.
>
> Increase the economic return to the Yukon from its resources.

Develop non-renewable resources at a rate that assures more stable economic growth.

Establish greater Yukon control over the Territory's natural resources."

The Yukon government will act to support and encourage development projects that, considering all costs and benefits, provide a net economic benefit to the Territory. The Yukon Cabinet, as a means of determining net economic benefits from activity such as hydrocarbon development, has directed the preparation, for all major developments, of a development assessment process that will complement and eventually replace the federal review process. This streamlined process will include all other resource reviews. It will be used to determine whether and how major projects will proceed. The development assessment process will provide for greater public input; consolidation and reduction of regulatory requirements where possible; and, shorter decision-making times.

The process will assess the developers' statements of socio-economic and environmental impacts, and of direct and indirect costs and benefits of the development. The public, especially the affected communities, and the developer will have input into the decision. There will also be a sub-agreement in the Land Claim Agreement requiring the establishment of a development assessment process.

It is anticipated that the period through to the year 2000 will see hydrocarbon development in the Yukon. Measures such as the Northern Energy Accord and the Development Assessment Process will ensure not only that Yukoners benefit from the hydrocarbon resources of the region but that a stable and fair oil and gas management regime is established for industry.

6.4 ENVIRONMENTAL ISSUES AND THEIR REGULATION: NORTHWEST TERRITORIAL VIEW

R.D. Livingston
Director of Policy and Planning
Department of Renewable Resources
Government of the Northwest Territories

It is my pleasure to provide a Government of the Northwest Territories' perspective on environmental issues and their regulation as it relates to Northern Hydrocarbon Development.

I have given my participation a lot of thought and struggled with how I might best contribute to the theme of development in the nineties. As the saying goes, if you don't know where you are headed, any road will take you there. Therefore, we must determine where we want to be in the next ten years and define the course of events necessary to achieve our goal of sustainable development. You will recall that Jim Bourque gave you a sense of the Northwest Territories and the priorities of its residents during his keynote address in Yellowknife. There is no question that northern people are concerned about environmental issues. In fact, polls across Canada have repeatedly indicated that the environment is one of the foremost issues of concern for all Canadians.

In the North, people have a close relationship with the land and depend on its resources for the subsistence and economic opportunities that they provide. Those of you who have spent any time north of the 60th parallel will understand when I say that things have changed dramatically over the past ten years. The Northwest Territories continues to be a very dynamic socio-political and economic environment. I know that our Government Leader, in his address to you in Yellowknife, articulated some of the many challenges confronting the political and constitutional evolution of the Government of the Northwest Territories.

The message that I would like to convey to you today is that the development of our environment and economy must advance together as part of the same decision-making process. The sustainable development of our resources is essential to the long-term economic, cultural and social well being of northern residents. Hydrocarbon development must contribute to our sustainable development goals. While the situation is complex and still evolving, it is vitally important that industry work closely with northern government to meet the challenges that must be confronted in order to develop the northern economy. Industry has a very important role to play: northern development must be seen as an opportunity to learn from our past development experiences in other regions in order to improve the process in the North. We have an obligation to ensure that the resources of the North are used wisely so that the generations to follow will have the same opportunities that we have now. If industry and government fail to cooperate through effective communication, only misunderstanding and mistrust can result.

I would like to first describe the present situation that we as a Government of the Northwest Territories department, responsible for environmental management, find ourselves in when dealing with environmental management issues. The Government of the Northwest Territories has limited legal authority over land and water management or non-renewable resource

development at present. This is gradually changing, however, through the slow process of devolution to which we are now committed, and the signing of the agreement-in-principle on northern oil and gas management. The goal of the Government of the Northwest Territories is to develop provincial-type responsibilities over our resources. The agreement-in-principle on the Northern Accord is a major step towards this goal.

Three separate land claims divide the Northwest Territories into three parcels, each with unique management features. Land claimants have defined, or are in the process of defining, specific resource management structures to allow their involvement in resource management decisions. Government processes must be flexible to adjust to the different management structures in each of the claims.

The Government of the Northwest Territories is presently working with the native organizations to define and implement efficient and effective resource management systems. Through our efforts, we are trying to overcome the potential for duplication between the federal government, the territorial government and land claimants; the potential for costly bureaucratic structures and processes; and, an unnecessarily complex legal and policy environment. In the meantime, we must all cooperate to the best of our ability as this process evolves.

The North will undoubtedly be different from the provinces. Industry has a very important contribution to make to the development of northern resource management structures, policies and legislation. I feel that we are well on the way to a 'made-in-the-North' approach to resource management and development.

The Inuvialuit Land Claim has been settled and our experiences with the implementation of this claim have been positive. As an example, I refer to the Gulf Amauligak Project. The people at Gulf Canada should be complimented for their efforts in the preparation of a mutually agreeable Wildlife Compensation Agreement with the Inuvialuit.

An agreement-in-principle has recently been signed between the federal government and the Dene-Metis land claimants. As a result, a great deal of work will be required over the next year and a half to prepare for the finalization and implementation of this land claim. The Nunavut claim of the eastern Arctic Inuit is still a few years away.

The World Conservation Strategy, the Brundtland Commission on Environment and Development, and most recently, the Canadian Task Force on the Environment and the Economy have established a very positive direction for dealing with environmental issues by recommending better integration of environmental and economic decisions. I would like to mention a number of initiatives that we have taken in order to achieve our sustainable development goals.

To provide clear direction for resource development initiatives we are preparing a 'made-in-the-North' GNWT Environmental Protection Policy with supporting legislation. This initiative depends upon the sound participation of industry. Our government is also seeking to enhance our Environmental Assessment responsibilities by developing a Northern Environmental Project Screening and Review Process. We expect this initiative to improve the efficiency and effectiveness of northern development review. One additional, and very important project worth

noting is our Sustainable Development Policy now nearing completion. This policy is directed towards achieving better integration in resource management, maintaining environmental quality, the establishment of Conservation Areas, and putting in place Transboundary Resource Management Agreements.

There are many opportunities for governments and industry to work together in all phases of industrial development and environmental management. There are a number of topics which warrant further discussion here today. Ideas such as: 'Round Tables' on the environment and the economy; resource management agreements between government and industry; bilateral or multilateral agreements on resource management processes; and structuring input in the policy, legislative development, and land use planning processes.

We face many challenges as well as opportunities in the next few years. The question at hand is, how can we best work together in the spirit of cooperation for the benefit of all Canadians?

6.5 ENVIRONMENTAL ISSUES AND THEIR REGULATION: FEDERAL VIEW

Raymond Robinson
Chairman
Federal Environmental Assessment Review Office
Government of Canada

The federal government is committed to strengthening Northerners' right to make their own decisions, or at the very least to be fully involved in the decisions that effect them, and also to protecting the environment. From Evan Birchard we had a very clear statement of the need to build into industry decision-making a range of concerns, including the environment, that parallel many of those that concern governments. The decision-making base for the industry is in effect going to have to be broadened; from my territorial colleagues you have heard of an outline of the agreements-in-principle with the federal government to move ever greater revenue and responsibility from Ottawa to the territorial capitals.

I think it would be useful if I used the federal Environmental Assessment and Review Process (EARP) as an example of what happens when you get devolution of authority (whether this be devolution or transfer of responsibility). It is also important to reflect on the newly emerging native authorities and the role they will play in this area. The concern of course is to try and simplify decision-making and reduce duplication. The purpose of the EARP is not to establish a process just for the sake of it but rather to ensure that decision-makers are informed about environmental implications of the project they are making a decision on.

Ideally, incorporated in that is a good measure of public consultation. So the concept and orientation of EARP is certainly in keeping with what we have been discussing. What needs to be understood is that the processes and requirements of the federal EARP do not stand by themselves or are not written in iron, or that they have to be applied regardless of what else is going on in government in terms of devolution of authority in the North. On the contrary, since they exist for the purpose of informing decision-makers, then if these decision-makers are not in the federal government, for whatever reason and under whatever mechanism, the request for the application of the EARP also disappears. It is important to understand that. This is one of the differences between the EARP process and, for example, the National Energy Board (NEB). It is a significant difference; there is a direct correlation between the requirement to apply EARP processes and the need for specific federal decisions governing whatever it is you would apply the EARP to. If those decision-making authorities move elsewhere from Ottawa, then the requirement to apply the EARP disappears as well. That's a point that needs to be very clearly understood. I've mentioned the NEB as an area of concern, particularly to the pipeline part of the energy industry, especially the potential duplication between the requirements of the National Energy Board and the requirements of the federal EARP. Such mechanisms to avoid duplication are subject to the reform of the EARP process and that is being considered by the government. Right now, before the federal Cabinet are proposals for extensive change in the federal EARP requirements, among them, increased flexibility in order to deal with issues of duplication.

In the interim, while waiting for these decisions to be made, as devolution proceeds, it is important that we have structures that are flexible to make sense out of the review procedure. To use an example that is not in the North but similar to it, Labrador, I am going to use an example of a project we are currently assessing there and give you a sense of the kind of flexible arrangements that can be made to deal with the problem of multiple decision points and multiple authorities in a particular decision. There, what we are looking at is a proposal for a NATO air training base which would involve about 350 sorties a day, mostly of European fighter jet aircraft which would then fly over Labrador and parts of northern Quebec at about 100 feet above the ground. There has been concern expressed, hence, we have set up an environment assessment panel to review this activity.

Northern Quebec is the area covered by the James Bay Agreement which was the first major land claim agreement in the country. Structures have been set up under that agreement that are quite similar in concept, if not in detail, to what now exists in the Inuvialuit region of the North and may well exist in the other land claim areas currently under negotiation. In particular, there is a formal environmental assessment process which is laid out under federal law which applies to this area for assessing activities in the area covered by the agreement. In addition, the airbase itself, is located in the province of Newfoundland and Labrador which has a formal legislated environmental assessment process. Similarly the area to be overflown is in the province of Quebec which also has a fully legislated environment assessment process.

There is hardly anything that could be more federal than a defence base, so the federal environmental assessment is also applied! So we had a dilemma, each of these parties had a legislative mandate to initiate its own independent review and could have done so. What we did was negotiate an agreement with the Kativik Regional Government which is the area affected by the proposal, meeting 12 principles which they gave us for the review entailing not only their involvement in the terms of reference but their nominations appointment to the panel. These principles also covered their involvement in the secretariat and certain procedures that are compatible with the way they wanted the process carried out. Similarly, we negotiated understandings with the province of Newfoundland and the province of Quebec also involving persons identified by those governments as appropriate for the panel and discussed with them the terms of reference for the review. We are now proceeding with the review. The results of the review will be fed into those four decision-making areas, each one will receive common recommendations and a common database. That does not mean that they will all agree on the result. They have very different perspectives on this issue but what it does mean is that the business of review will be coordinated, come out in one package and place upon the proponent only one single burden of possession of data and information.

In the North in particular, anticipating the developments there, we have been asked by the NWT government, through Mr. McKnight, to establish a panel to review a proposed uranium mine (near Baker Lake). In this situation, before legal devolution has taken place to the territorial government and before the creation of a native authority that might emerge in that area as a result of a land claim, we are nonetheless taking a practice run at what might apply under those circumstances. The terms of reference are being negotiated with the territorial government which is receiving input from the local community at Baker Lake and from the Kitiknuit Inuit Association which is the native organization in that area. In addition, advice is being received from these bodies as to who should be on these panels and this combination

basically means that we believe that we should end up with a process that reflects the mixture of interest in the area and which will produce a review that will go to the decision-makers, whoever they might be, that will be common for each of them. So we do think that there is scope for what you might call the application of common sense in review processes that help pull them together. I have used the above examples so that you can see that we are working at this and are able to produce that kind of coordinated result.

6.6

ENVIRONMENTAL ISSUES AND THEIR REGULATION: ACADEMIC VIEW

Michael Robinson
Executive Director
Arctic Institute of America

SOME ENVIRONMENTAL AND SOCIO-ECONOMIC HISTORY

In the development of Canadian practice in this area there is a definite human history that parallels the statutory and regulatory one. I think that there are at least four generations of practitioners, and I suspect many of you will share the same sense of this history. Looking back to the 1960s from the present I remember our Elders' generation, the Mackenzie Valley generation, and the Mega Project generation. Today I think we are in the presence of the Environmental Technocrat generation. To put flesh on bones, let me mention some names:

The Elders' Generation

Carson Templeton, Bill Mair, Tom Beck, Maurice Strong, Max Wapnford, and Gerry Andrews. These men and many others were environmental practitioners before Berger: they pioneered a discipline based on their personal values and skills and laid the foundation for careers in industry and government. While some of these names will be familiar, others are already disappearing into the historical mists.

The Mackenzie Valley Generation

Tom Berger, Hugh Brody, Michael Jackson, Ed Mirosh, John Bayly, Lorraine Allison, George Branden, Pat Carney, Bob Blair. These people, through the medium of a very long and very expensive commission of inquiry contributed to the creation of Canada's international reputation as an environmentally and socially aware country on the topic of northern development. Their combined impact re-wrote the collective regulatory handbook and gave the incentive to an employment boom that peaked in government and industry during the next generation.

The Mega Project Generation

Here we meet most of the environmental regulators, industry managers, private sector consultants and public sector lobbyists present in this room today. This is the generation of Barry Virtue, Harold Millican, Nigel Bankes, John Naysmith, Art Giroux, Pat Duffy, Bill Pierce, John Burrell, Debbie DeLancey, Ian Blue and a host of others.

On a sobering note it should also be said that this is the generation of boom and bust - of the recession of 1981-82 and the mass layoffs of 1986. Many of its members have had to move on to new frontiers, new careers and new dreams.

The Environmental Technocrat Generation

This generation is very much with us today in much reduced numbers, but with a dazzling variety of new computer programs, graduate degrees and a sobering legacy of public expectations. These practitioners are the environmental managers of the late 1980s and 1990s and they face the challenge of the emerging environmental agenda.

While the previous generations derived their work from conventional and mega projects, this generation will increasingly derive its work from the consequences of global environmental change, public pressure for strict environmental stewardship and the emerging clamour for something called sustainable economic development.

While projects or dreams of projects drove the old agenda, the new one will be driven by the 'end products' of fossil fuel combustion, the greenhouse effect, ozone depletion, the transportation and storage of hazardous wastes, and ultimately the restructuring of the North American economy in the direction of information and service employment, and away from manufacturing and the dominance of goods-producing industries.

On the plus side, the new technocrats have better data collection, storage, transfer and synthesis capabilities than ever before. As well, industry has entrenched environmentalists in project groups and frontier divisions (where they still exist). The Canadian Petroleum Association has taken a lead position in promoting an awareness of the linkages between environment and development.

On the down side, the productive linkage with the previous generations of environmental managers and regulators is tenuous. Many of the old guard are retiring or moving on to new careers without having the chance to develop younger proteges or fully brief their replacements. The once mighty northern mega project development groups are now very small, and in some cases institutional memory has been reduced to a few individuals. Of course many projects have disappeared altogether. What we risk in this process is simply the loss of the traditional wisdom of our elders. We often hear about this in a native context: how often do we think about it in a northern development context? The price of this loss of experience may be very high. Studies will be re-studied, old data will be gathered again, and old lessons will be re-learned. While this in itself is a worrisome prospect, the new generation of environmental managers will also have to keep a weather eye open for new issues.

Via the two new Northern Accord agreements-in-principle and the Dene-Metis agreement-in-principle, three significant new environmental management regimes will be created North of 60. Devolution of federal regulatory authority will be further enhanced by the imminent Free Trade Agreement, and the National Energy Board hearing of old will become much less the focus for northern development decisions, if it continues at all. The omnipresent industry and planning interest trips to Ottawa will rapidly decline in favour of trips to Whitehorse and Yellowknife.

In Whitehorse and Yellowknife a new team of regulatory professionals will view environmental and social issues from the perspective of homeland rather than frontier, and they will do so with educational experience and qualifications every bit the equal of their industry counterpar's. High on their agendas will be project contributions to a sustainable northern economy, free from the boom and bust cycles endemic to southern industries, and detailed concern about project linkages to the northern environment.

Meanwhile, in the South the public interest groups will increasingly speak to the international aspects of hydrocarbon development and leave the northern stewardship issues to Northerners themselves (a collective northern sigh of relief may well be heard at this juncture).

In the weekly Globe and Mail columns of Dr. David Suzuki and the occasional contributions of Dr. Bill Rees we see already the new face of groups like The Canadian Arctic Resources Committee and Greenpeace. Two weeks ago on page 7 of the Globe, Dr. Rees received a full half-page to detail his concerns about Canada's combined government-industry investment in the development of offshore production technology for Hibernia. Simply put, he asks the question, "Are we as a nation, carefully and deliberately cornering the market on technological and environmental expertise that no other nation on earth will be able to afford? If so - is this a good investment?"

CONCLUSIONS

Canada has a long and distinguished record of environmental stewardship in the realm of northern development. As a country we have invested millions of dollars in the study of the environmental and social impacts of northern development and our northern regulatory regimes and land claim settlements are models for a wide range of developing and industrialized nations. To maintain this record in the 1990s, however, industry and government practitioners will have to strive hard to recapture the accumulated experience and wisdom of our environmental elders before they all leave the scene. At the same time, the new generation of environmental managers will have to keep a close watch over their shoulders as global environmental concerns encroach upon the traditional Canadian project focus.

The efficacy of this approach has not been lost on no less than Mikhail Gorbachev. Over the last 12 months Maurice Strong has been a frequent visitor at his Black Sea dacha. Having demonstrated world class skills as an arms negotiator, the President of the Soviet Union now wishes to become a world class environmentalist. Needless to say, his tutor is one of our Canadian elders!

Bill Klassen: I'd like to react to Mike Robinson's comments about the generations of elders. Looking at it from the perspective of somebody who's lived in the North for the last 22 years, but listening to the names I was struck by the fact that, and you redeemed yourself at the end, there wasn't a Sam Ratty mentioned, there wasn't a Nellie Cournoyea mentioned, there wasn't an Elijah Smith mentioned, there wasn't a Paul Ben Cassay, Charlie Peter Charlie. I think what you did was to demonstrate how much we still view the environmental issues from a southern perspective. We don't seem to credit the people who have lived in the North and who will continue to live there when the big projects subside and who will continue to make their living from the land. I'm not being critical, but it's an observation on observations.

Michael Robinson: And a very fair comment. I guess the major influence on my career to date has been the people who have gone from the South to the North and have been environmental managers. It's very much the case now that that situation is being turned on its head. So, I think that if you were to make a list of people who will be influential in Canadian regulatory efforts for the next 10 years, perhaps the children of the people you mentioned will be on the list, and many of those people as well.

Evan Birchard (to Ray Robinson): One of the great conundrums of the environmental assessment process from a proponent standpoint is when to 'kick in' without actually knowing the process that you are about to get yourself into. Thus, there's a reluctance to formally put an application before an agency until you have an assurance as to what the process is. At the same time many of the agencies are reluctant to tell you what the process is until they see the application on their desk.

Ray Robinson: Well there is, of course, a very logical reason for the reluctance on both sides, but the perspective of government is that the nature of the process that applies, under the federal system at least, is dependent on the nature of the project in terms of its impact on the environment. That cannot be determined in advance of the material that is provided by industry and in advance of details on the project. But, I think that tends to beg the question as to why one engages in it, as I said earlier, it's not process for process' sake, but rather an attempt to bring about informed decision-making and what that means, surely, is that the environment is considered, as you remarked earlier, right into the beginning of planning and decision-making. And that's where it should take place. What I can say to you without any hesitation is that if a company does that seriously and designs its projects accordingly, it is not nearly as likely to have problems as if it attempts to catch up at a later stage, forced by whatever processes are in vogue.

Evan Birchard: I can't disagree except that one of the initial aspects of determining the economic viability of a project is in fact the timing as to when that project might get off the ground. Therefore, you have to have pretty good estimates as to what that approval process is going to entail from a timing standpoint.

Bill Klassen: I wonder then, does the industry's interest in land use planning have to do with that concern about timing? I'm curious about that support for land use planning you mentioned.

Evan Birchard: Land use planning will hopefully go a long way to resolving a number of those kinds of concerns - the regulatory process will still be there, but we'll be able to, hopefully, incorporate land use planning information into our decision-making process.

Pat Duffy: I wonder if I could ask you Ron (Livingston) whether you have the benefit of regular contact with the industry associations - I'm thinking of the hydrocarbon industry but you might also want to make comparisons with mining. Do you feel that you and your group are able to keep in close touch, given that you have a lot on your plate and that you do need comments, reaction, from time to time?

Ron Livingston: I would say that the oil and gas industry, particularly, has been very cooperative in responding to our policy initiatives, especially the Arctic Petroleum Association. They are on our list and are directly involved in some of the recent policy issues, like the environmental protection policy. They do make a concerted effort to respond to drafts that we send to them.

Evan Birchard: With respect to some of the work that's coming out of the Renewable Resources Branch (GNWT), they have been very good in ensuring that, through the CPA and other agencies, individual companies have an opportunity to review and comment on the Environmental Protection Policy and a number of other documents that the industry has had a direct involvement in.

Ron Livingston: I have one question of industry and it reflects a bit on our evaluation of the Norman Wells project and some of our other experiences. The one difficulty we have is in terms of the project, as it was actually tabled, comes down to the definition of the project. The project tends to evolve as time goes on and, of course, that affects the way it's evaluated. Related to that is the scheduling of the project, particularly in the Norman Wells case. An approval in principle and then a scheduling of review documents, whether they are additional studies or additional environmental protection plans which, because we were a small government, was very difficult for us to deal with. An addendum to that is once construction is started, what is the fast-tracking of the project which changes the assessment and impact scenarios? A clear definition in each of those areas would be beneficial from a government's perspective.

Evan Birchard: In an effort to get audience participation, why don't I direct the answer to David Wishart on that one?

Dave Wishart: I guess it's a process problem in essence, with respect to the Norman Wells project, the process was that we went to the National Energy Board and FEARO on a conceptual basis to review a project starting at 'A', ending at 'B' and how we could develop it. Once that process was agreed, and you have an agreement from the major stakeholders on the regulatory side, we did detailed planning. Generally, people take things from a conceptual basis through to a detailed planning basis, and this was, in the case of the Norman Wells project, some 3 years of planning, from something very general to something very site-specific. Indeed, with respect to the environmental protection plan, it took it down to a very activity and very site-specific set of plans. As a proponent, that's the normal process of development of a project. I can see the problems with a small government as we probably inundated them with data in a very short timeframe looking for feedback. I think, ultimately, we submitted some 75 documents in that 3 year period.

But, I don't know of a way that one can take it from a general conceptual basis through to a site-specific basis without, in essence, submitting on a timely basis and looking for input. Perhaps when a project does come along and looks like it would take significant time commitments, government agencies could gear up and dedicate a larger staff to review those particular documents.

Pat Duffy: Excuse me Ron, I'm just going to interject a point here that the project that you are talking about was planned well by industry and introduced to government with the reports that you refer to without the benefit of the guidelines and the advice that would have come if the application had been 'permitted' allowing EARP, NEB and other groups to react.

Ron Livingston: Well, I appreciate the comment because it's a classic example of industry and government sitting down and actually identifying those various documents and the terms of reference so there's a clear understanding of what's going to be produced. Because of the complexities in that situation with the NEB involved and our government at that point not having as much involvement in the process, it created some difficulties for us.

Clay Beattie: I am a former General in the Canadian Forces, Commander Northern Region; I was involved in the cleanup after the Cosmos 954 crash. What strikes me as significant is that we are addressing a problem that isn't just in our own backyard. Why aren't we generating some interest in getting this on the agenda of the United Nations. I think Canada should take a strong stand on cleaning up the global environment and such action must be worldwide. This was one of the things the 'Northern Lights' Project (Cosmos 954) underlined for us.

Ray Robinson: I think I might just respond on behalf of the federal government to say that we are doing exactly that. In his speech to the United Nations in New York, the Prime Minister devoted a significant portion to the environment, and argued very strongly for a higher environmental consciousness and focus in the U.N. body and, of course, cited at length the report, Our Common Future, which has been referred to so frequently. In addition, not long before that, Finance Minister Wilson, attending the general meeting of all of the members of the World Bank in Berlin, underlined in very strong terms the Canadian view that World Bank's environmental assessment processes should be considerably strengthened and laid out a number of proposals that were really quite remarkable in their extent.

Also, in Toronto this year, the Canadian government hosted a conference on the global atmosphere and from that the government has committed itself to promoting and pursuing a law of the atmosphere. We are, I think, generally familiar with the law of the sea and the very difficult negotiations surrounding that over the years. Hopefully, the effort for a law of the atmosphere will not be as difficult. To begin it, we are calling for a meeting of legal experts from a variety of countries, in 1989, who will have the responsibility of developing the agenda for the negotiation of a law of the atmosphere. The federal government is taking this extremely seriously and we intend to use such influence as we do have at the United Nations to press very strongly for attention by that body to environmental issues.

Michael Robinson: I think that before we can achieve the kind of credibility necessary at the U.N. to advance this kind of an agenda, we have to resolve some internal inconsistency at home. When the Prime Minister is speaking to the economic first ministers in the Commonwealth, we are promoting a 'growth for growth's sake', a more of the same, a con-

tinuance of the benefits we've enjoyed during the 50s, 60s and the 70s and when it becomes time to promote sustainable economic development, we're all lined up behind environmental linkages and sustainable growth. We have this internal inconsistency at the policy level which to my thinking hasn't been clarified sufficiently yet.

Branko Ladanyi: My feeling is that the question of continuity and transfer of knowledge is very important. This is what education is all about and obviously we, the educators, are affected by oil prices, nevertheless the job has to go on. The problem has been that the industry has not really shown much interest in the future need for trained staff. I think that if we are left alone until the next boom occurs then everybody will be looking for graduates that are not there. The students we are graduating now cannot find jobs in their chosen fields. I think something should be done in this area, perhaps professional scholarships.

Evan Birchard: Well, I don't disagree, except that one of the realities in our industry, is that with scholarships and grants oil prices do tend to play havoc with them over the short term. Over the long term, however, I think companies like the one I work for, Imperial Oil, and others, do have fairly extensive scholarships and such programs, of which the effects of weak and strong oil prices tends to even out in the long term. But, I can't disagree with you that, over the short term, weak prices do affect university funding.

Pat Duffy: I would like to know whether we're in good shape in terms of Research and Development for the North and whether there are people in the universities who can be trained to do that work. The fact is there aren't that many projects on the horizon, but do we have the training going on at the level that will bring forward the graduates when they are needed? Michael Robinson has mentioned a database information system for work in the North. I'd like to give him a brief opportunity to describe the facilities and the information that his organization has.

Michael Robinson: The Arctic Institute of North America has, to a large degree, the corporate memories of several megaprojects through the filings, the publications and the great mass of literature that was produced during their productive lifetimes. We have both the proprietary and the public materials from the Canadian Arctic Gas consortium, publications from PanArctic and from the various iterations of the Polar Gas Project and we have numerous pipeline studies relating to the Alaska Highway Gas Pipeline system. It's not stretching it too much to say that quite often we get a phone call from a corporate librarian saying "The library is being downsized and we're closing the shop, you can either come and pick up the books or they're going to the dump". We pick up the books and what we try and do with industry and various foundations' support, is to enter all of this material onto our Arctic Science and Technology Information System (ASTIS), which is the largest northern database in Canada which, along with Boreal northern titles, from the Boreal Institute at the University of Alberta in Edmonton, is being looked at as the foundation of the Canadian Polar Information System which has been promoted by Dr. Symons in his recent report, The Shield of Achilles. So, there is, because of industry and Canadian foundation support, an effort at the Arctic Institute to maintain much of the print database that has been put together over the last 25 years. It's a very expensive activity but the long term reward is that people will be able to 'keyword search' our database and a few others when megaproject development gets underway again and determine the studies that exist and are still useful and do not replicate them. It's a ludicrous situation.

We're spending between 50 and 100 thousand dollars a year over the next couple of years to maintain the bare bones of a database, but the utility of that database is that when things pick up, studies costing in excess of hundreds of thousands of dollars will not have to be done because appropriate relevant information will be available through our library.

Pat Duffy: I'd like to ask one question of Dr. Loken. It has to do with the level of research that's going on in the North and whether there may be an impending shortfall in investment in that area or whether we should continue at the present levels of support. Would you care to comment?

Olav Loken: I'm Olav Loken from the Environmental Studies Research Funds, COGLA. It was rather interesting to listen to Jack Clark this morning, when he said this is a good time to be in university research. It is not often you hear comments of that type. I take this as an indication that some of the changes in the government policy vis a vis research is having some positive effects.

As you know, there is an increasing amount of funding through NSERC to universities and there is a deliberate policy on trying to capitalize, to a larger extent than previously, on the tremendous human resources that we have in our university faculties and university facilities.

On the question of the level of funding in the North, it's fair to say that in terms of government levels there has been an overall loss of real dollars in recent years. Many in this room were, for example, at the NSERC, when they discontinued special northern supplement grants that were used to cover the high cost of northern research. We have on the other hand seen some very positive responses recently, when for example the Polar Shelf Project was granted a very significant increase in its budget in terms of improving their facilities in the North and also in their operating grants.

The question of the level of research, whether it is appropriate or not, is really a very difficult one to answer. But, let me add that the Panel of Energy R&D funding which contributes very significantly to northern work, was approved for another three years at the same level of effort, about 90 million dollars; a fair amount of that will continue to go into northern projects.

In addition to the level of funding, we also have the organization of northern research and I think it's fair to point out the effort that is going on, particularly within IANA and MOSST, to ensure that we are managing and organizing our efforts in the best possible way. Most of you will be familiar with the working group that is headed by Fred Roots and the recent announcement that there will be a Polar Commission Centre. So I'm looking forward to seeing what is coming out of that and if they possibly can find some better ways of organizing our efforts up there.

Pat Duffy: At this point I would like to thank all the contributors to this discussion.

6.8

AN INTEGRATED ENVIRONMENTAL REVIEW PROCESS FOR NORTHERN HYDROCARBON DEVELOPMENT: YES OR NO?

Report of Working Group
chaired by

David Marshall
Director, Northern Region
Federal Environmental Assessment Review Office

BACKGROUND

As a result of more decision-making authority for reviewing and approving northern oil and gas development projects being transferred to territorial governments and native groups, there is potential for some proliferation of environmental review processes leading to duplication of effort and use of resources. This potential exists where northern oil and gas proposals involve more than one jurisdiction. The petroleum industry and governments are concerned about this and would support the development of a coordinated or integrated review process for project proposals involving more than one jurisdiction.

OBJECTIVES

Workshops were scheduled for both Yellowknife and Calgary to explore the need for, and configuration of, a coordinated or integrated review process. At both sessions there was good representation from the oil and gas industry and various government agencies and native organizations with varied environmental review responsibilities.

CONCLUSIONS

1. A coordinated or integrated review process should be established for northern oil and gas projects involving more than one jurisdiction.

2. There are a number of options available for more effective review processes ranging from coordinated reviews to integrated reviews to hybrids to joint administrations.

3. Most environmental review processes possess enough flexibility in their respective mandates to work closely with others.

4. The respective levels of government (federal, territorial) should develop effective internal review processes first.

5. DIAND should coordinate the development of a complete publication which would document all current environmental review processes.

RECOMMENDATION

It was recommended that all existing and developing administrations with environmental review responsibilities work together to design a framework that would define respective responsibilities for the review of any northern oil and gas project involving more than one jurisdiction with the basic objective of minimizing duplication. The GNWT offered to initiate such an exercise by hosting a workshop in Yellowknife early in 1989.

CHAPTER 7

FINANCE AND TRADE ISSUES

7.1

FINANCIAL ENGINEERING FOR NORTHERN HYDROCARBON DEVELOPMENT

Frank S. Rosar
Vice-President, Corporate Banking Division
The Toronto-Dominion Bank

As the Vice-President in charge of our Bank's energy loans, I am aware of the vital importance of the northern hydrocarbon resources to the prosperity of the North as well as all of Canada. I hope this conference will help advance the day when the oil, and gas, start to bring benefits to all involved.

I have chosen to use the term "financial engineering" in the title of my remarks because it neatly captures the idea that the financing of large-scale projects can be every bit as complex as the engineering. Both have to be right before the project can be successful. Further, the appropriate form of financing depends very much on the engineering, while the latitude that can be given to the engineers should depend on what is financeable.

In major resource plays like the Beaufort, the engineering often runs ahead of the financing. There have been billions of dollars spent for exploration to date, but, how much thought has been given to financing production when the time comes? The one element is useless without the other.

In looking at the availability of financing for the North, I think it is useful to consider three topics. The first is the general attitude of the banks to project financing. Second is a review of the North Sea experience, which is the most relevant precedent from the real world. Third is the list of issues that are specific to the northern situation. After reviewing each of these, I will try to pull my thoughts together into some conclusions.

In the area of project financings, banks are frequently seen as frustratingly conservative lenders. We feel we have to be that way. In making term loans, we obtain small and fixed spreads over our own cost of funds. If there is upside in a deal, banks do not share it. If the deal goes sour, the bank stands to take a big loss. A major hit from a project financing can wipe out the profits from literally hundreds of conventional banking deals. We clearly do not have the same approach as the venture capitalist. He counts on losing money on two out of ten deals and only expects to make a really big killing on another two. In the jargon of the trade, the other six deals will be "living dead". (He goes into all ten deals because he cannot tell ahead of time which ones will be the big winners.)

Project financings tend to be concentrated in the primary sectors of the economy - energy, minerals, forestry and so on. Because of banks' limited upside, their willingness to do project deals varies directly with the fortunes of these sectors - that is to say, with the price cycle for basic commodities. The "Golden Age" of project financings, not surprisingly, coincided with the great oil and commodity price boom of the 1970s. Many of the deals done at that time have turned out very badly and the appetite for project risk at this time is at rather a low ebb. Banks have learned "deflationary expectations" and factor this new perception of price risk into their assessment of projects.

This is a significant point because financing a project the size of Amauligak will require the involvement of numerous banks from many countries. Even if the sponsors can convince several banks of the soundness of the project, raising the money may still be difficult because of the system's aversion to project debt. Of course, that aversion may change. Upward trends in commodity prices could well lead to greater boldness in the financial community, which would pave the way for an easier deal for future developments.

In evaluating project financing opportunities, banks seek reassurance about various types of risk that are present in all projects. That reassurance can come in the form of greater familiarity and comfort with the project. Or it can require that another party to the project assume some or all of the risk. In structuring any project financing, a bank will wish to see the various risks borne by those who control them. It will wish to see its own risk confined to areas with which it feels comfortable.

I would like to look briefly at three of the key areas of risk in any project. Listed in descending order of the banks' aversion to them, they are completion risk, operating risk and marketing or price risk.

Completion risk refers to any of the possible events that can jeopardize viability of a project before it is in operation. Included would be such factors as cost overruns, design problems, delays, technical problems (including abandonment) and so on. Banks are very averse to completion risk because it depends on so many factors that they cannot be familiar with. As a result, banks will not normally put their funds at risk in a project until it is complete. Until that time, banks will require recourse to project sponsors or outside guarantees. It is important to note that a bank will define completion differently from an engineer. For the engineer, completion may simply mean the point at which production is technically possible. A bank is more likely to define completion as occurring only after the project has shown its ability to meet a specified level of production over a period of time. The goods produced must be acceptable to the market. If there are doubts about the cost of production, the bank's completion test may also require that the specified level of output be achieved at or below a particular cost.

If we move on now to operating risk, we find we are still dealing with a range of issues with which banks have little direct experience. Operating risk covers post-completion events such as equipment failure or inefficiency, unanticipated operating expenses and any other factors affecting the ability of the project to produce at the expected level of profitability. In the petroleum industry, one of the most obvious and frequent operating risks is that the production profile over time falls short of what was projected. This creates the possibility of a project being a technical success but a financial failure. Engineers may well deem a well successful in that the total production over the life of the well closely matched their expectations, that is, they had correctly predicted the size of the pool; yet it may be a financial failure if the year-to-year profile of production was lower than expected and as a result there were debt servicing shortfalls. The public and the media generally focus on reserve numbers - "X million barrels of oil in Amauligak" - rather than on the costs of producing those reserves. But those costs are the key to financial success and financeability.

Lenders can achieve some comfort with operating risks. Part of the comfort may come from dealing with principals who are clearly experienced in the type of project that is being undertaken. Further comfort will be found if the project resembles other projects that have

been successfully undertaken, by the same or other sponsors. Lenders are unlikely to get involved with a little-known junior oil company undertaking a pioneering production program in an untapped, offshore field. They may get involved, and may share certain risks with, an experienced and well-capitalized major company undertaking a carefully planned development program in a well-mapped field. Experience is the key to lenders' comfort in this regard. But of course, there are two kinds of experience - good and bad - as we shall see in a moment when I look at the North Sea experience.

Of the three types of risk, marketing risk is the easiest for banks to evaluate and get comfortable with. Our everyday credit-granting activities require us constantly to assess the markets in which our clients operate. Moreover, in project situations it is common for the sponsors to seek firm commitments from purchasers before commencing construction. The presence of purchase contracts from reputable clients will do much to enhance the financeability of a project. With such contracts in place, a lender can focus mainly on price risk and may well be prepared to share in that risk with the principals.

Much of what I have said about banks' evaluation of project risks comes back to the need for experience or familiarity on the part of lenders. However, if we now turn to the topic of actual financings in the North Sea, we see very clearly how experience can cut both ways.

Had things gone as the sponsors expected, we would find that lenders accepted more and more risks as the North Sea fields became more developed. This was not the case. Among the major financings, the gutsiest (from a lender's standpoint) took place quite early in the process. Loans made to BP for its Forties field development in 1972 exposed lenders to technical risks even during the development phase; throughout the life of the loans, repayment depended on the ability of BP to find and produce sufficient oil.

As the 1970s progressed, lending criteria tightened, with lenders retaining recourse to the borrower (or a third party guarantor) throughout the life of the loans, or releasing that recourse only after the project met pre-set production criteria. Financings in the 1980s have combined recourse to strong sponsors with some exposure to the projects themselves.

Obviously this pattern owes something to the gyrations of oil prices. The way banks felt about oil price prospects between 1972 and 1975 was quite different from the way they felt later in the 1970s, or in the 1980s. If price were the only factor, we could at the present time be reasonably optimistic about project financing for Canada's offshore. But there is another factor: production experience.

In Calgary in June of 1986, the Petroleum Society of CIM heard a paper by B. van Oort of the B.C. Ministry of Energy, on Lessons learned in North Sea Oil Field Developments. Van Oort looked at the technical experience with two of the major fields, Thistle and Beatrice. Thistle was financed in 1976 with a U.K. government guarantee during development, but with a portion of the financing convertible to a production payment subject to achievement of an agreed output. Beatrice was financed in 1979 with a completion guarantee from the sponsor and an undertaking regarding production levels.

Van Oort states that "the Thistle and Beatrice projects can be counted among the foremost North Sea technical success stories". The non-engineer (me) reads the story and wonders what a failure would look like. Consider Thistle: projected peak oil production was expected to be 180-200,000 bpd, to be reached in late 1978 and sustained for two years. The actual peak of 123,000 bpd was not achieved until 1982 and was sustained for only one year. Project start-up was delayed one year with an 84% cost overrun. Peak water output was twice the original forecast. Because of low annual production, total field life expectancy increased to 23 years from an original estimate of 18 years, so that total projected recovery fell only 10 percent short of initial forecasts. I take it that the accuracy of the reserve estimate is the basis for calling Thistle a technical success.

Measured by its Internal Rate of Return, Thistle was also a financial success, but only because the impact of cost overruns and disappointing output was swamped by the second oil price surge of the late 1970s. A lender who took any completion risk and was relying on the first years of production to achieve repayment would not feel he had struck a good deal.

Beatrice is no better. Peak output of 96,000 bpd was forecast, from two platforms, with that level sustained for three years. The outcome? A peak of 50,000 bpd for one year only, with even that requiring a third platform - with a 70% cost overrun. Even with the oil price windfall, the return on Beatrice was a shabby 8.1%, less than half the sponsors' forecast.

These are not isolated results. Of 23 fields analyzed in the October 1985 issue of the Petroleum Economist, 14 would have returned less than 10% had it not been for the second oil price shock. The average cost overrun was 109%; one field managed a staggering 1073% overrun. Only three of the 23 brought in under budget. These are not good odds for a bank lending at low spreads. Clearly, there was a sound basis for the risk aversion that became evident in North Sea lending.

Let's turn now to the local situation. When one starts to review the hydrocarbon potential of the North, the mind starts to "boggle"; our Bank of course has been involved with financings of northern development before but this has been through our Minings & Metals Group which has financed hard rock mineral exploration and production in the North. To date the production of hydrocarbons in the North has been either a local event, produced in small quantities for local needs, or developed by majors such as the development of Norman Wells oil pool by Imperial Oil. Given our perception that the North's enormous coal reserves will not be developed in the foreseeable future, we will concentrate on the outlook for oil and gas.

Experimental oil has been taken from the Arctic Islands. Currently Gulf Oil at the Amauligak field is proposing to produce oil on a test basis from this field, and ship the oil out by tanker, to test the volumetric estimates and determine the future deliverability of the reservoir.

Certainly this type of production testing is exactly what a lender is looking for when he is trying to minimize reservoir risk. But there are a lot of other concerns which must be conquered before major development in the North is undertaken. Environmental concerns will be a major factor for bank participation. While the euphemism that banks are only concerned with money may on the surface seem correct, the bank is concerned that the operation of production in any northern development is done in an environmentally sound manner. This is because a project financed by the bank which ends up damaging the environment can end up having

costly clean up expenses which could jeopardize the project's ability to repay a bank. Also, our Bank, which has been serving Canadians for well over 100 years, wishes to be in business for several hundred more years and therefore wishes to be part of a healthy Canada for all it's citizens.

For this reason a cautious approach to development of the North would likely be more beneficial in the long run than a panic development, such as was seen with the Canol pipeline development of Norman Wells during the second world war effort to supply oil for the allies' fight against Japan. We are well aware of the environmental consequences of such a rush effort and the dynamically opposite effect of deliberate and planned construction of the current Norman Wells pipeline by Imperial Oil. The Imperial Oil effort had the support of the local peoples and did not have any of the drastic environmental consequences of their first pipeline effort from that pool.

When we talk about development of hydrocarbons we foresee the production of oil as being the most likely first development with, eventually, natural gas also being developed. As you might have gathered from our initial discussions the actual project financing of the production platforms and facilities will likely have to be a sponsor risk until some experience is gained with the reservoirs in question, and the bank feels comfortable with the economics and production characteristics of those reservoirs. What is likely that the banks would be interested in financing up front would be the pipeline facilities to carry oil or natural gas out of the North. These typically are financed on a utility rate of return basis and a lender would have the comfort of knowing that the repayment of such facilities would not be limited to a single pool but rather the entire resources of the North. He would realize in his risk assessment that even if the first reservoir tied into a pipeline did, for some reason, fail to produce at it's expected rates, that other pools have been discovered in the North which would fill the pipeline and the geological potential of the basin is such that it is likely other oil pools will be found to keep the pipeline full in the future.

In addition, the Bank has now entered the business of helping companies raise equity funds since the deregulation of the banks was brought into effect. The banks would be very interested and will be seeking to provide a full package of financing opportunities to sponsors which could include equity financing, where that was the most appropriate form of funds being required given the risks involved, as well as junior and senior debt which we would either place with third parties who were interested in having the upside rewards associated with an equity or junior debt position to offset the greater risk levels, or perhaps taken by ourselves where a lower risk level would justify the profit margins associated with a straightforward senior debt.

It will be important for the sponsors to understand the need to engineer the financing as well as engineer the production of oil and gas and ensure that the appropriate type of funding is provided for each phase of the project. By being cognizant of the risk involved with each phase of the project and then by segmenting the financing accordingly, the sponsor can obtain the most cost efficient form of funding. It is unreasonable to expect that a single line of seismic will convince a lender to take a small spread on his funds and finance everything from a pipeline to the Beaufort Sea, to the exploratory wells and production platforms. However, when each phase is looked at in isolation there are opportunities for everyone, from the risk capital groups who wish to drill the exploratory wells, to the debt financiers on the other end of the financial spectrum who would prefer to finance something of a pipeline nature. It is

useful to get someone like a bank involved early in the project to give advice on the various types of financings that are available so that the engineering and geological developments can take into account the realities of the financial market place.

I have probably by now reinforced all of your preconceptions about bankers. It is true that we tend to focus on how things break down, not up, while engineers ponder the opportunities in developing a multitude of fields with huge amounts recoverable of oil and gas. Neither side finds it easy to see the other point of view, but the whole jigsaw puzzle - financing, engineering as well as topics that others here are covering, such as the regulatory environment - has to be pieced together to make a good project. What I have tried to do today is to pick out specific areas where engineering and technical experts can provide lenders with knowledge that can allow projects to be financed.

Setting up the financing for production from the Beaufort Sea will be difficult and complex. Strong sponsors will be needed to get any project up and running and producing oil and gas in commercial quantities. For that first platform, the prototype aspect may prevent lenders from ever sharing the risk. But, if the basin is successfully developed - in terms of cash flow produced, more than barrels of oil, or cubic feet of gas produced - the need for strong sponsors should diminish, with debt financing becoming more readily available.

What is clear to engineers, lenders and governments alike is that development of the North is of vital importance to the local people as well as all of Canada. The potential of the northern fields, in a world where security of energy supply is again a growing concern, requires all parties to work together to solve problems promptly and effectively. The exchange of views at this conference is an important part of that process and I appreciate the opportunity of being involved here today.

QUESTIONS/DISCUSSION

Michael Jarvis: Can you comment on the role of government policy and how you see its impact on the reliability of investments?

Frank Rosar: In our assessment of projects we typically don't get involved other than in an advisory capacity. We don't get involved putting out dollars until such time that we're reasonably certain of the development's potential. The North has had a very erratic history and it could very well continue to have with the current price of oil. Also, it is generally well recognized by all concerned that the potential of the reserves in the southern part of Canada, the tar sands, the Far East, and Saudi Arabia means that we have enough oil for quite some time. This will continue to dampen the oil price and consequently the viability of some of these projects in the North. There is no doubt about it. What will drive them I think, in part at least, is the security of supply question. But, there are projects like Oslo and Hibernia, whereby the government has put an awful lot of money into them already. And, quite frankly, to some degree, are starting to impact on the resources of their sponsors. Take some of the sponsors of Oslo, who are also sponsors in Syncrude and the combined implications of that, for some of them, is a billion dollars. There is only so much strain that the finances of a particular company can take and you have to garner your resources and husband them, making it difficult for the bankers and for the company.

Jean Gravel: I understand that when projects get into the 'mega-bucks', banks normally would want to hedge a little by getting into a financial consortium. At what level of financing do you consider a consortium? And when you do that, do you share all of the technical information with the various financial partners?

Frank Rosar: With respect to financial consortiums, obviously developments that we are considering here today are very complex and require a lot of money. Typically, banks in Canada and in the international sphere, are trying to reduce their exposure to any one particular name. For example, our leverage buyout portfolio, or our policy relating thereto, is that if we get involved in a leverage buyout, we attempt to reduce our position to no more than, say, $50-100 million. Although, initially we might very well underwrite up to $500 million.

As far as sharing information, these financings are so large, and the implications to the lending banks are so great that they don't make their decisions blind. They certainly have access to all of the financial data that they need. The fact that we were to underwrite a situation does not put our guarantee on the merits of the financing. It just says that, on that particular day, we liked the deal. It might not necessarily be liked by another organization. It depends on the situation. Typically, all banks try to reduce their exposure. There is a very active secondary market with the Schedule B banks and the European banks and it's quite common that a banking syndicate could, on the large financings, be 100 banks - depending on the size of the deal. For financings in the North we would envisage that there would be a truly international financing arrangement.

7.2

THE CANADIAN OIL INDUSTRY: A COMMENTARY

Ian M. Doig
Editor
Doig's Digest

My comments today will be directed to two areas. First, I will offer some views on the North. Second, I will comment on the current direction of the Canadian oil industry and what I refer to as 'Missing Role Models'. Both can be wrapped into one context - attitudinal changes are needed.

These thoughts are offered as somebody who was once inside the industry but now is on the outside viewing, commenting and writing about events. I do not expect all my thoughts today to be taken as the gospel truth, the same as you would not take the views of governments or industry as being the definitive word. But if I can leave with you one thought that might help you in your future decision-making, I will be happy. Two thoughts would be a distinct bonus.

As was mentioned, I am the editor and publisher of my own newsletter, DOIG'S DIGEST, which has subscribers worldwide - from Moscow to Tokyo - and is honoured to have many subscribers in the North. It is not an investment tout and does not deal in the hard news which gets coverage from the present news sources. Rather, the DIGEST goes in behind and gives comments on what this hard news means. We also initiate our own studies. One of these is a Special Report on the Hibernia development.

Our subscribers are governments (federal, provincial and foreign), Canadian and international operating and service sector companies, banks and investment houses. In our September edition we discussed Amauligak, and the land claims and Northern Accord issues. In the October issue we analyze the capital cost components of the Canadian megaprojects that are being force-fed to an unwilling marketplace and compare these costs to some other new development costs elsewhere in the world.

The timing of this conference is interesting. There is no physical drilling going on to take peoples' thoughts off the task at hand. But events of the last few years have given some strong signals. Drilling results in the main Amauligak structure took the short-term steam out of the decision-making process. Touted recoverable reserves of 700-800 million bbls got moved back to the 450-500 million bbls range - nothing to sneeze at but certainly not enough to base a 24-inch pipeline on. Now the consortium has its work cut out as the members study their options. The O-86 well on the west side showed encouragement but with prices at the current level, not enough to see drilling next summer. Thus, Amauligak is on hold until future events unfold.

The most encouraging news out of Amauligak was the emergence of a new player - BP Petroleum. The U.K. company, which is a dominant player on the Alaska side, stepped forward to take a 29% interest in the $74 million test. I'll touch on the wider possibilities of this move in a few minutes.

Chevron Canada makes an appearance this winter to drill its Pelly sprayed ice island well in the Mackenzie Delta. This farm-in well from Esso Resources will be followed by another well next year in the Delta plus the drilling of a well on its Fort Good Hope acreage. And of course, Amoco Canada will make its appearance next summer with two wells being spudded in the western Beaufort Sea. So all in all, exploration is not dead. Development is on hold.

Esso Resources and Shell Canada have finally filed their concurrent conditional Mackenzie Delta natural gas export applications with the National Energy Board. These applications could eventually lead to 10 TCF moving to southern North American markets by the mid-1990s.

The needed attitudinal changes that I referred to, show themselves in these applications. Compared to 10 years ago, the producers are going to control their own destinies this time around. How deep are the wounds from those battles? These applications will make an interesting read. And of course, there is the intrigue of an oil versus gas line up the Mackenzie Valley.

If the Canada-U.S. Free Trade Agreement is a plus to the Canadian oil and gas industry, it is a double plus to the North. The Agreement will aid putting into place the needed financial infrastructure to get these high cost projects off the ground. A Canadian Beaufort Sea discovery will make an interesting read. Lying just to the West is the Alyeska system.

The mid-1990s tariff from pump station #1 to Valdez will be in the order of (U.S.) $2.25 - $2.50/bbl. In comparison, the tariff from Norman Wells into Edmonton now runs at about (C) $8.75/bbl. The magnitude of this difference means that this U.S. alternative will at least have to be looked at. The natural gas side is equally intriguing. With 35-40 TCF discovered in the Prudhoe Bay area, will a joint project gain momentum? And right in the middle of these thoughts lies the Arctic National Wildlife Refuge. A U.S. decision on this problem might still be two years away.

A look at two recent Alaska offshore sales shows that there definitely is a tomorrow. It also gives a peek into the future. At these sales, industry spent approximately (U.S.) $850 million for 515 blocks. The players are looking into the late 1990s timeframe.

Within the next three years, I believe, it will be difficult to see the international border on a Beaufort Sea activity map. The same 8-10 players will be on both sides of the border. Who are they? The Exxon/Esso family, Amoco, ARCO, BP Development, Shell, Chevron and Gulf Canada, with its drilling navy, will be foremost among this group. Interesting times lie ahead for the Beaufort Sea/Mackenzie Delta area.

Downturns hurt. We are all experiencing these hurts in the oil crises of the last two years. We all have had relatives, friends and colleagues laid off. No longer is there any social disgrace for somebody to say they are unemployed. Uncertainty prevails. Nobody but a fool should feel secure. Young qualified people are confused by events beyond their grasp, as these events have been beyond the grasps of leaders in government and industry. Serious structural changes are occurring in the oil industry and we all hang on to the roller coaster for dear life hoping that it will slow down.

World events have acquired a momentum of their own. Industry and governments deal in a labyrinth of contradictory facts. Industry knows that it should be daring and take risks when the share-holders and financial community tell it to go slow; it strives for public understanding when it gives a divided message of what it wants.

On the other hand, governments also present the same confused picture. They move from one public opinion poll to the next. They have spent a decade devising plans to take money away from the industry and now are asked to give it back after the money has already been spent or committed. On the other hand, industry leaders who asked for deregulation to let the marketplace work, now do not like what they see and are scared.

In summary, both industry and governments are lacking in strong leadership. There does not seem to be that one person who can tie the pieces together. To put it another way, I repeat a truism that Atlantic Canadians learn at birth. We live for today. Nobody is comfortable with the future because it is not like it used to be. But we need some understanding of what the future might bring for decision-making today.

As serious as the current situation is, my concern is that governments and industry have again overreacted. During the last decade, our experience in this area has not been pretty. In 1978, the federal government changed direction and instituted its Policies for Energy Self-Reliance. Its central feature was to narrow the price spread between Canadian and imported crude oil. The $3 difference was to be done away with over the next three years. In three years the spread was $11.

The sad experience of the National Energy Program (NEP) in 1980 is well documented. The country took off on this new adventure at a time when the early signs were showing that the upward price spiral was over. And three years ago the nation moved to price deregulation when more advanced indicators were showing that supply/demand was way out of balance and a price correction was coming. One wonders about a government that moves to tax credits for a child-care system and subsidies for the oil industry.

We have now completed the first month of the post-Dome Petroleum era. This period of turmoil is finally over. The Amoco Canada offer took 532 days to complete - one day for each old testament merchant who came to Calgary loaning money to Dome. Unfortunately, most were successful which led to the proud maple leaf falling.

A look back over the last eight years shows the different cycles that Canadian frontier energy projects have gone through. In the late 1970s, the major world concern was supply - the world was running out of oil and any discovery would certainly have a major role to play. Then in the early 1980s, the frontier and megaprojects became viewed as cash cows. The ill-conceived NEP showed the world the shallowness of energy knowledge in our labyrinth along the Rideau River. Civil servants from around the world flocked to Ottawa to view this master plan that died less than two years after birth. Next came the period of job creations. By this time there was excess oil supply and prices had leveled. But possibly these high cost and high risk projects could be sold as job creators. Now we are into the fourth cycle in this eight-year timeframe - will they be job creators for politicians who are now into a federal election.

Now I am going to say a few things that hurt me. But damn it, they need an airing as they have been on the street for some time. I have always felt pride of my time both in the industry and on its immediate circumference. On the whole, the role models were there in spades. People were hard-working and inventive, but times are changing and it concerns me. The role models are still there but their fraternity grows smaller.

Let me explain. The events leading up to the Western Accord announced on March 28, 1985, did not just happen. Government officials on the banks of the Rideau and North Saskatchewan Rivers were well worked over. "Give us deregulation and let the marketplace work" became the battle cry of the day. Many were not sure exactly what they were saying but it sounded good. Industry had its Linus blanket. The sigh of relief heard that March morning went from one end of the western Canadian basin to the other.

Unfortunately, events a few months later showed that industry was no better at forecasting the future than governments were in late 1980 with the NEP. And now industry not only dances with the very devil (governments) that it was trying to say goodbye to, it is now in bed with them more than it was during the period of government control.

Like a boomerang, industry's actions have come back to place it in a position of more servitude than it was before. The Canadian public is being sold a tale that these are not normal times in the oil industry and that a little financial relief will see it through. "Share the Pain" with us, Canadians are being asked. But on close examination, some of these so-called industry leaders are not willing to "Share the Pain" also. But then again life looks different through the tinted glass of expensive cars, bought with the interest-free loans that came with their golden parachutes. Although these leaders say one thing in public, their lifestyles suggest that oil is still priced at (U.S.) $35/bbl. It goes without saying that the actions of some industry leaders are disenfranchising the legitimate concerns of many.

If oil industry associations are going to give national platforms to their leaders when they are nominated for one-year periods, Canadians want to see clean white smoke coming out of the voting rooms. As they are asked for more incentive and royalty dollars, Canadians are discovering that some of these votes are showing dark clouds.

The actions of industry are strongly suggesting that if Canadians are going to be asked to "Share the Pain", they will want to "Share the Gain" when sunny days come; they will have earned that right. Industry asking for more public funds is moving at a faster pace than public acceptability. Tolerance is diminishing.

Two years ago when oil prices were on the skids, the officers of an oil company, well-known to be among the highest salaried in the oil patch, showed their true worth. When the company was letting employees go, the directors, showing great stupidity, granted these same officers a bonus of $850,000. The president of this company, who is being paid $305,000 and has a non-interest bearing loan of $730,000 plus a golden parachute, gets a bonus of $350,000. And within months, that same person is allowed to head up a Canadian oil industry association asking for more incentive and royalty relief. When organizations get around to awarding their annual prizes, this one will have to be given serious consideration for the 'dumbbell award'.

To place this $850,000 which went into the pockets of five or six individuals, in perspective, I move to a recent study initiated by the Petroleum Services Association of Canada. That money could have drilled a completed oil well in the Rainbow Lake area of northern Alberta. The rig for this 7,000 foot test would be on location for 27 days and have an employment multiplier of 773 persons.

The drilling of this well only represents 29% of the total well costs with casing and attachments, rig transportation, engineering supervision and administration plus 13 other cost components making up the remainder of the total well costs.

By not drilling this well, prairie people, already under the severe strain of seeing their farms go further into debt, were denied the opportunity of working. And a so-called industry leader is making a mockery out of the very incentive plan that the association he now heads had pleaded for. And to make matters worse, this same group was successful this past year in actively working over bureaucrats and getting $125,000 of public monies so that 17 privileged firms could visit world financial capitals to sell their stock that Canadians would not touch. To add to this horror story, some of these firms were not even Canadian owned.

All in all, there was not a basket case in the lot. But here were public leaders standing in line for further funding from the public trough. Thank goodness politicians have not been amused and these types of trips will now be past tense. And to think that $125,000 could have saved one prairie farmer from going into bankruptcy. Unfortunately, this is not an isolated case. The head of another Canadian association actively asking for increased financial incentives and tax relief is from a company spending the majority of its money outside of Canada. No rule against that but it does not wash well.

And it does not stop there. The past head of a major association has been to the winner's circle twice in the last three years with most generous incentive plans. Three years ago, this person was one of 11 executives that cashed in $3.5 million through cash, an incentive scheme and a notorious 'phantom' stock option plan. And very recently, this same individual was one of seven executives who received a farewell present of $8 million. This individual took me to task for writing about this generosity. His defence is that it is normal industry practice. And therein lies the rub - these are not normal times.

Industry is now admitting defeat in the main battle that was fought during the 1980-85 period. Industry wanted government out of its business - let the market forces work. Well, market forces are working and some do not like the results. I have written and talked about this matter before. One industry leader calls it gossipy. My upbringing strongly says that ethical decay is not gossipy.

Maybe the oil associations should be taking a look at recent pronouncements from the Investment Dealers Association of Canada (IDA), which is undergoing its own serious restructuring - both financially and ethically. The departing Chairman of the IDA accused his own fraternity of greed and promoting exotic financial products that neither buyers nor sellers fully understood.

Canadian universities are now making the study of ethics a prerequisite at their business schools. So maybe hope is on the way. From my seat on the LRT train, I look at things differently. An interesting comparison can be made between the plight of the junior exploration companies and the Ontario core market situation.

The oil companies talk of the virtues of the marketplace, knowing if they are wrong, governments will bail them out. And with a federal election before them, Ottawa has been more than willing to satisfy their political foot soldiers. The Ontario government argues that there is no need for a natural gas core market - let the market forces work. But they realize if they are wrong, governments will move forward to right the situation. Thus, both parties make their positions with safety nets underneath them. If the parties are wrong, the fall will not hurt and they will be protected.

As I said at the outset, I hope that these comments are of some use to your decision-making. In the late 1960s and early 1970s, a young raspy-voiced song writer delighted world concerts with his happy songs. And maybe Rod McKuen had the oil and gas plays of the Canadian North in mind when he wrote One Day Soon. One line from that wonderful song sums up my closing comment: "I may not find the clover but at least I'll have a try and who knows, maybe one day I'll catch that wave and ride".

7.3

ENERGY TRADE UNDER THE CANADA - U.S. FREE TRADE AGREEMENT

Marshall A. Crowe
President
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The Free Trade Agreement, if implemented, will prohibit the volume and price controls and price discrimination imposed over the years by Canada on our energy trade.

Chapter Nine of the Agreement entitled Energy comprises Articles 901 through 909 and Annexes 902.5 and 905.2. The substantive provisions relating to the sorts of restrictions experienced in the past are the following:

ARTICLE 902: IMPORT AND EXPORT RESTRICTIONS

In this Article, the Parties "affirm their respective rights and obligations under the General Agreement on Tariffs and Trade (GATT) with respect to prohibitions or restrictions on bilateral trade in energy goods." The key provision is Article XI:1 of the GATT:

> "No prohibitions or restrictions other than duties, taxes or other charges, whether made effective through quotas, import or export licences or other measures, shall be instituted or maintained by any contracting Party on the importation of any product of the territory of any other contracting Party or on the exportation or sale for export of any product destined for the territory of any other contracting Party."

The Parties state their understanding that the GATT prohibits "minimum export price requirements" and "minimum import price requirements" in "any circumstances in which any other form of quantitative restriction is prohibited", except as permitted in enforcing countervailing or anti-dumping orders, a form of restriction not yet seriously encountered in our energy trade. This Article is identical in substance to Article 407:2 dealing generally with our bilateral trade in goods. Articles 902 and 407 presumably prevent application to Canada of any U.S. plan to impose a minimum import price for oil.

ARTICLE 903: EXPORT TAXES

The Article, using the wording of Article 408 for all goods, reads:

> "Neither Party shall maintain or introduce any tax, duty, or charge on the export of any energy good to the other Party, unless such tax, duty, or charge is also maintained or introduced on such energy good when destined for domestic consumption."

It is interesting to note in passing that the Constitution of the United States, in Article I, Section 9.5, forbids any export tax. The Canadian export tax on oil mentioned above must have seemed not only unneighbourly but downright un-American.

ARTICLE 904: OTHER EXPORT MEASURES

This Article spells out the limitations and special provisions introduced by the Agreement which further modify the strictly-defined conditions under which quantitative restrictions on exports are permitted under the GATT, which the Parties in Article 902 have reaffirmed. Article 904 refers to Articles XI:2(a) and XX(g), (i) and (j) of the GATT as the provisions authorizing a restriction on exports otherwise prohibited by Article XI of the GATT. The most relevant are likely to be Articles XI:2(a) and XX(g). Under Article XI:2(a), a quantitative restriction may be "...temporarily applied to prevent or relieve critical shortages...". However, the broader exception in GATT Article XX(g) is probably the relevant consideration. Under this Article a quantitative restriction can be imposed "relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption."

This seems to mean that there can be no surplus procedure, since a surplus procedure must involve a quantitative restriction of exports to quantities judged to be surplus to Canadian needs, unless and until there are also in force "restrictions on domestic production or consumption". Thus, if we are curtailing energy deliveries at home we can curtail exports, but only in conformity with Article 904 of the Free Trade Agreement. Article 904(a) requires that the restriction not reduce the proportion of the total export shipments to a Party of a particular energy good, relative to the "total supply" of the exporting Party, below the proportion prevailing in the most recent 36-month period, or other agreed representative period. "Total supply" means shipments to domestic users and foreign users from domestic production and domestic inventory, and from imports as appropriate. Thus if 40% of our natural gas production was going to the U.S. before a period of curtailment in Canada they must continue to have access to 40% of our reduced total production.

Article 904(b) provides further that, during a period of restriction permitted under the GATT, the Party may not impose a higher price for exports than the price charged for domestic consumption by measures such as licences, fees, taxation and minimum price requirements, in short any governmental measure. A higher export price attributable only to market forces during a period of restriction is not ruled out.

Since each Party is responsible to ensure compliance with the Agreement by state, provincial and local governments, Article 904(b) would appear to rule out lower prices, compared to export prices, set by provincial governments, for sales within a province during an authorized period of restriction. Would the Agreement, strictly interpreted, also permit a challenge to the removal permit systems of producing provinces? They are quantitative restrictions and would have to be applied consistently with the GATT and the proportionality obligations of the Agreement.

Under Article 904(c) a restriction must not disrupt normal channels of supply to the other Party or the normal proportions among specific energy goods supplied to the other Party. Thus the proportionality requirement of Article 904(a) could not be met, as regards oil, by offering only, for example, heavy oil, or, in the case of gas, by offering gas only at one border point.

The obligation not to disrupt normal channels of supply would also suggest that gas export contracts with the best rate-of-take record would be entitled to the largest share in a period of restriction.

ARTICLE 905: REGULATORY AND OTHER MEASURES

This Article is intended to deal with recent Canadian complaints about FERC actions. If either Party considers that energy regulatory actions by the other Party "would directly result in discrimination against its energy goods or its persons inconsistent with the principles of this Agreement" there is a right of consultation with the other Party. Articles 902, 903, and 904 which narrowly limit permissible restrictions on exports, and were presumably included to meet U.S. concerns, involve prohibition of certain actions. Complaints under Article 905, which was presumably put in to meet Canadian concerns, led only to consultation about certain actions.

ARTICLE 906: GOVERNMENT INCENTIVES FOR ENERGY RESOURCE DEVELOPMENT

This Article reads:

> "Both Parties have agreed to allow existing or future incentives for oil and gas exploration, development and related activities in order to maintain the reserve base for these energy resources."

This Article should shield the trade in energy from allegations of subsidizing and possible countervailing action.

ARTICLE 907: NATIONAL SECURITY MEASURES

Restrictions allowed pursuant to defence considerations are not likely to be disruptive so long as the countries are allied in defence matters. It should be noted however, that the U.S. oil import quotas of the 1960s were justified on defence grounds.

ANNEX 905.2

Paragraph 1 requires elimination, on exports of energy goods to the U.S., of the "least cost alternative test" the third of three price tests traditionally applied by the NEB. The Board applies, to electricity export applications, three price tests originally developed for natural gas. These are that the export price:

1) would recover associated costs incurred in Canada,
2) would be no less than the price to Canadians for equivalent service in related areas,
3) would not be materially less than the importing country's least-cost alternative at the same location.

This now applies primarily to electricity exports. However, although only the third test is specifically banned, it seems to me that all three export price tests are questionable under the terms of the Agreement. For example, the second price test, an export price no less than the price to Canadians, could well violate Articles 902 and 904(b) of the Agreement if it were applied in such a way as to require a higher price at the border than for domestic users. In fact, Article 902.2 states the understanding of the Parties that when there are no GATT-approved quantitative restrictions in effect GATT prohibits "minimum export price requirements" which seems to cover the second price test. This is more stringent than the price rule in a period of restriction when only a "higher price for exports" (Article 904(b)) is prohibited.

The conclusion seems inescapable, that almost all of the special measures employed by Canada over many years intended to safeguard Canadian energy needs, or to shelter Canadians from the impact of world prices while getting the maximum available price for exports, would be prohibited by this Agreement. The introductory sentence from Chapter Nine, "Both (sides) remain free to determine whether and when to allow exports..." is true only within the narrow limits prescribed in the Articles of the Agreement and of the GATT. This has given rise to a spirited debate in Canada between producing and consuming interests. The Government will probably require the NEB to continue to monitor and licence exports, but this would be reduced to a statistical and accounting exercise if the bite of quantitative restrictions on energy exports is removed. Annex 905.2, paragraph 4, reads:

> "It is understood that the implementation of this Chapter includes the administration of any 'surplus tests' on the export of any energy good to the other Party in a manner consistent with the provisions of Articles 902, 903 and 904."

I think this means there can be no restriction of exports as a result of a surplus test unless there is domestic curtailment and subject to the proportionality rule.

Unfortunately, the Agreement is not so categorical in its provisions regarding Canadian access to the U.S. market, at least when the obstacle is in the area of U.S. regulatory actions.

AN ACT TO IMPLEMENT THE FREE TRADE AGREEMENT BETWEEN CANADA AND THE UNITED STATES OF AMERICA

The trade bill includes amendments to a number of existing federal statutes to bring them into conformity with the FTA. Attached are the proposed amendments to the National Energy Board Act. Appendices of the following can be found on page 207 and they are essential to understand the NEB Act amendments:

- NEB Act - Part VI, Sections 80 to 85 (Appendix 1)
- FTA Chapter Nine: Trade in Energy (Appendix 2)

As noted Article 904 of the FTA allows export restrictions on energy goods only when they can be justified by the government under the provisions of the GATT, specifically Article XI:2(a) (temporary restrictions to relieve critical shortages) or Article XX(g), (i) and (j). The most likely basis would be XX(g), "measures relating to the conservation of exhaustible natural resources

if such measures are made effective in conjunction with restrictions on domestic production or consumption". If a restriction on exports which can be so justified is applied it must also comply with other conditions in Article 904 of the FTA of which the main one is that a restriction may not reduce the proportion of total export shipments to the U.S. of the energy good in question relative to Canada's total supply compared to the proportion in the most recent 36-month period for which data are available.

These FTA terms must be contrasted with the main condition for export approval set out in paragraph 83(a) of the NEB Act which is that the Board must satisfy itself that the quantity of oil, gas, or power to be exported does not exceed the surplus remaining after due allowance for reasonably foreseeable requirements for use in Canada.

My view is that the FTA would bring about a fundamental change in the way the Board has traditionally controlled exports. Instead of being required to deny an export which did not pass a surplus test it could, under the FTA, restrict exports only in strict accordance with the GATT Articles, in the most likely case only in conjunction with restrictions on the domestic Canadian market, and in any case with the requirement of continuing proportional treatment for the U.S. market.

There were some suggestions by officials in Ottawa and others interested in the Board's work to the effect that the ability to control exports was not seriously changed and the Board could carry on pretty much as before. The legislation should put an end to this notion.

The key provision is the new Section 84.5 which says that the Board cannot refuse to issue a licence for an export unless the Governor in Council (the Cabinet) has issued an order as provided for in Section 84.3 declaring that restrictions are justified under Article 904 of the FTA. Therefore, it will be the Government, not the Board, which will decide when an export application will be denied in whole or in part and it will do so by making a declaration pursuant to Section 84.3.

However, it is possible that in practice the declaration under Section 84.3 may be made on the recommendation of the Board since under Section 84.4 the Board may suspend its determination of an application for export in order to request that the Minister recommend to the Governor in Council that a Section 84.3 declaration allowing restriction of exports be made. However, under Section 84.3 the Governor in Council may also take this action on its own initiative without any recommendation from the Board.

Since paragraph 83(a) of the Act has not been removed the Board must still satisfy itself that a proposed export is surplus to reasonable foreseeable requirements in Canada. It is therefore necessary to make it clear that the Board cannot refuse to issue a licence for an export even if it is not so satisfied unless there is also a Section 84.3 declaration in place. So, Section 84.5 requires the Board to issue a licence in the absence of a Section 84.3 order and Section 84.6 reinforces this by providing that the Board may issue a licence, "despite its not being satisfied in accordance with paragraph 83(a)", if the Minister declines to recommend a Section 84.3 declaration or the Governor in Council declines to make it or no order has been made within one hundred and twenty days after the making of the request. Thus, when a declaration under Section 84.3 has not been made, Sections 84.5(1) and 84.6 will operate to preclude the possibility of a denial of an application for export based on a negative finding under paragraph 83(a).

In addition to these specific new constraints on the Board's powers regarding exports, Subsection 84.2(1) requires the Board, in exercising its powers and performing its duties, to "give effect to the Agreement". Subsection 84.2(2) also authorizes the Governor in Council to make orders of general application respecting the manner in which the Board performs the duty imposed on it by Subsection 84.2(1), and respecting the interpretation to be given to the Agreement by the Board. That is, it is not left to the Board to provide its own interpretation of what the FTA requires it to do.

The final amendment deals with the question of export price controls. Subsection 85(2) of the NEB Act is repealed and a new subsection is substituted for it. The purpose of Subsection 85(2) was to authorize the Government, if it wished to do so, to set export prices for oil or gas. The new provision allows an exemption of any prescribed country or any kind of oil or gas "or type of service in relation thereto" from any price regulations that government may make. This is presumably to allow the government to exempt the U.S. from such regulations if they are inconsistent with the FTA. The reference to "type of service" may be included to allow exemptions of oil or gas exported by pipeline which, in practice, would limit the exemption to the U.S. This was the device used by the U.S. in the 1960s and 1970s to exempt Canada from oil import quotas. The revision also allows the government to prescribe countries to which the prices would apply and to prescribe different prices for different countries.

Consideration of the amendments as a whole raises the question of whether the Board's current surplus procedure is consistent with the FTA. The FTA states that it is understood that the implementation of the Energy Chapter of the Agreement includes the administration of any surplus test on the export of any energy good in a manner consistent with the provisions of Articles 902, 903 and 904 of the FTA (Annex 905.2 Regulatory and Other Measures, provision number 4).

Article 902 affirms that the GATT rules will apply in that there may, in general, be no prohibitions or restrictions in bilateral trade in energy goods. Article 903 bans export taxes on energy goods. Article 904 cites the GATT exceptions which allow restrictions in certain circumstances and places certain special limits on the use of these exceptions. These are the proportionality clause, the ban on discriminatory export prices set by a governmental authority, and that the restriction does not require the disruption of normal channels of supply or normal proportions among specific energy goods.

What kind of surplus procedure would be consistent with these Articles of the FTA? It would seem that it must be one directed mainly to supply and demand because the exceptions allowed in GATT Articles XI and XX deal primarily with situations of physical shortage and conserving resources in short supply.

Many of the considerations in the Board's latest Market-Based Procedure for assessing surplus may no longer be acceptable. For instance, the Complaints Procedure which amounts to a kind of right of first refusal for Canadian buyers would seem to be ruled out. Such a procedure with an emphasis on the possibility that an application for export may be denied because a domestic user is not able to contract for gas at a similar price is arguably not consistent with Article 904 since that is not a circumstance which would justify the introduction of a restriction on exports. Another part of the current procedure is the Export Impact Assessment, intended to allow the Board to judge, whether as a result of a proposed export, Canadians would have difficulty in meeting their energy requirements at fair market prices.

Finally, there is the Public Interest Determination with its cost benefit analysis. There may be similar flaws inherent in both these aspects of the procedure when they are related directly to the requirements of Article 904.

In conclusion, what is the point of having any surplus test when the new legislation does not allow the Board to refuse an export solely on the grounds that it has not been satisfied as to surplus? A tentative answer is that some continuing surplus test may provide an important monitoring role for the Board. If paragraph 83(a) of the Act had been repealed the Board would have no lever to require from applicants and intervenors the data on which to base assessments of supply/demand balance in relation to domestic and export demand. These calculations and assessments could be the basis for Board recommendations to the Government as to the need for and timing of recourse to a Section 84.3 declaration to invoke FTA Article 904 and place some restrictions on exports. To the extent that the government continues to rely on the NEB as its chief advisor in these matters, the continuing surplus procedure may be justifiable even though it is no longer a determining factor in approving or rejecting a given export.

APPENDIX I

N.E.B. Act - Part VI, Sections 80-85

PART VI

EXPORTS AND IMPORTS

Oil, Gas and Power

80.1 [Repealed, 1980-81-82-83, c. 116, s. 22.]

Licence required

81. Except as otherwise authorized by or under the regulations, no person shall export any oil, gas or power or import any oil or gas except under the authority of and in accordance with a licence issued under this Part. R.S., c. N-6, s. 81; 1980-81-82-83, c. 116, s. 23.

Issue of Licences

Issue of licences

82. (1) Subject to the regulations, the Board may, on such terms and conditions as it may impose, issue licences

(*a*) for the exportation of power, oil or gas; and

(*b*) for the importation of oil or gas.

(2) [Repealed, 1980-81-82-83, c. 116, s. 24.]

Compliance

(3) Every licence is subject to the condition that the provisions of this Act and the regulations in force at the date of issue thereof and as subsequently enacted, made or amended, as well as every order made under the authority of this Act, will be complied with. R.S., c. N-6, s. 82; R.S., c. 27(1st Supp.), s. 27; 1980-81-82-83, c. 116, s. 24.

Considerations applicable to the issue of licences

83. On an application for a licence, the Board shall have regard to all considerations that appear to it to be relevant and, without limiting the generality of the foregoing, the Board shall

(*a*) satisfy itself that the quantity of oil, gas or power to be exported does not exceed the surplus remaining after due allowance has been made for the reasonably foreseeable requirements for use in Canada having regard, in the case of an application to export oil or gas, to the trends in the discovery of oil or gas in Canada;

(*b*) satisfy itself that the price to be charged by an applicant for power exported by him is just and reasonable in relation to the public interest; and

(*c*) where oil or gas is to be exported and subsequently imported or where oil or gas is to be imported, have regard to the equitable distribution of oil or gas, as the case may be, in Canada. R.S., c. N-6, s. 83; R.S., c. 27(1st Supp.), s. 28; 1980-81-82-83, c. 116, s. 25.

Revocation and Suspension

Revocation and suspension of licences

84. (1) Subject to subsection (2) and the regulations, the Board may by order, with the approval of the Governor in Council, revoke or suspend a licence if

(*a*) any term or condition thereof has not been complied with or has been contravened; or

(*b*) in the case of a licence, other than a licence for the exportation of power, the Board is of the opinion that the public convenience and necessity so requires.

Notice to licence holder

(2) No order shall be made under subsection (1) unless the Board has, in a notice sent to the holder of the licence, advised him of

(*a*) the term or condition of the licence that it is alleged has not been complied with or has been contravened, or

(*b*) the reasons upon which the opinion of the Board referred to in paragraph (1)(*b*) is based,

as the case may be, and the Board has afforded the holder a reasonable opportunity to be heard.

Revocation or suspension upon application, etc., of holder

(3) Notwithstanding subsections (1) and (2), the Board may, by order, revoke or suspend a licence upon the application or with the consent of the holder thereof. R.S., c. N-6, s. 84; R.S., c. 27(1st Supp.), s. 29; 1980-81-82-83, c. 116, s. 26.

Regulations

Regulations

85. (1) The Governor in Council may make regulations for carrying into effect the purposes and provisions of this Part and, without restricting the generality of the foregoing, may make regulations respecting

(*a*) the information to be furnished by applicants for licences and the procedure to be followed in applying for licences and in issuing licences;

(*b*) the duration of licences, not exceeding twenty-five years, from a date to be fixed in the licence, the approval required in respect of the issue of licences, the quantities that may be exported or imported under licences

and any other terms and conditions to which licences may be subject;

(*c*) units of measurement and measuring instruments or devices to be used in connection with the exportation of oil, gas or power or the importation of oil or gas;

(*d*) the inspection of any instruments, devices, plant, equipment, books, records or accounts or any other thing used for or in connection with the exportation of oil, gas or power or the importation of oil or gas;

(*e*) the immediate disposition of oil or gas seized by an officer referred to in section 86.1; and

(*f*) the circumstances in which and the terms and conditions subject to which the Board may make orders authorizing the exportation of oil, gas or power or the importation of oil or gas.

Regulations re price

(2) The Governor in Council may make regulations prescribing, in respect of oil or gas the export of which is authorized under this Part or any quality, kind or class of such oil or gas or type of service in relation thereto, the price at which such oil or gas shall be sold or the range of prices within which it shall be sold. R.S., c. N-6, s. 85; 1980-81-82-83, c. 116, s. 27.

(see next page for amendment to Act)

National Energy Board Act

137. The *National Energy Board Act* is amended by adding thereto, immediately after section 84 thereof, the following heading and sections:

"*Implementation of Free Trade Agreement*

84.1 In this section and sections 84.2 to 84.6,

"Agreement" has the same meaning as in the *Canada-United States Free Trade Agreement Implementation Act*;

"energy goods" means energy goods within the meaning of Chapter Nine of the Agreement for the exportation of which a licence issued under this Part or an order made under the regulations is required;

"United States" has the same meaning as in section 2 of the *Canada-United States Free Trade Agreement Implementation Act*.

84.2 (1) In exercising its powers and performing its duties, the Board shall give effect to the Agreement.

(2) The Governor in Council may, either on the recommendation of the Minister made at the request of the Board or on the Governor in Council's own motion, make orders of general application respecting the manner in which the Board shall perform the duty imposed on it by subsection (1) or the interpretation to be given to the Agreement by the Board for the purposes of this Act.

(3) An order made under subsection (2) is binding on the Board from the time it comes into force and, unless otherwise provided therein, applies in respect of matters pending before the Board at that time.

(4) The Board may, in order to request the making of an order under subsection (2), suspend the determination of any matter of which it is seised.

84.3 The Governor in Council may, by order, declare that the maintenance or introduction of a restriction on the exportation to the United States of energy goods or of any quality, kind or class thereof is justified under Article 904 of the Agreement.

84.4 Where, in the course of determining an application for a licence, or determining whether to make an order, for the exportation to the United States of energy goods or of any quality, kind or class thereof, the Board considers that the maintenance or introduction of a restriction on that exportation is in the public interest and that subparagraph (*a*), (*b*) or (*c*) of Article 904 of the Agreement would apply as a consequence of the restriction, the Board may, in order to request that the Minister recommend to the Governor in Council that an order be made under section 84.3 in respect of the relevant energy goods, suspend the determination until not later than one hundred and twenty days after the request is made.

84.5 (1) The Board may neither refuse to issue a licence or make an order nor revoke, suspend, change, alter or vary a licence or order for the exportation to the United States of energy goods or of any quality, kind or class thereof where that refusal, revocation, suspension, change, alteration or variation would constitute the maintenance or introduction of a restriction on that exportation as a consequence of which subparagraph (*a*), (*b*) or (*c*) of Article 904 of the Agreement would apply.

(2) Subsection (1) does not apply in respect of the exportation to the United States of such energy goods as are, or of such quality, kind or class thereof as is, referred to in an order made under section 84.3 during the time that the order is in force.

(3) Notwithstanding subsection (1), the Board may revoke, suspend, change, alter or vary a licence or order on the application or with the consent of its holder.

84.6 The Board may, despite its not being satisfied in accordance with paragraph 83(*a*), issue a licence for the exportation to the United States of such energy goods as were, or of such quality, kind or class thereof as was, referred to in a request made under section 84.4 if

(*a*) the Minister declines to recommend to the Governor in Council that an order be made under section 84.3;

(*b*) the Governor in Council declines to make the order; or

(*c*) no order is made within one hundred and twenty days after the making of the request."

138. Subsection 85(2) of the said Act is repealed and the following substituted therefor:

"(2) The Governor in Council may make regulations

(*a*) prescribing, in respect of oil or gas the export of which is authorized under this Part, or any quality, kind or class of that oil or gas or type of service in relation thereto, the price at which or the range of prices within which that oil or gas shall be sold;

(*b*) exempting oil or gas that is exported to a prescribed country, or any quality, kind or class of that oil or gas or type of service in relation thereto, from the application of regulations made under paragraph (*a*); and

(*c*) prescribing countries for the purposes of regulations made under paragraph (*b*).

(3) Regulations made under subsection (2) may prescribe different prices or ranges of prices in respect of different countries."

APPENDIX II

Extract from Free Trade Agreement

Chapter Nine: Trade in Energy

Over the past decade, bilateral trade in energy has assumed increasing importance to Canadians. Canada exports more than $10 billion in energy products annually, including oil, gas, electricity and uranium. Billions more are exported in the form of downstream products such as various oil and gas derivatives. That trade provides a livelihood for thousands of Canadians. Some of these exports, however, are limited or threatened by U.S. restrictions and regulatory actions, including restrictions on exports of upgraded Canadian uranium, discriminatory price actions on natural gas, tariffs and threatened import fees on crude oil and products, and threatened restrictions on electricity.

This chapter, which reproduces some of the provisions of Chapter Four as they relate to energy goods, will secure Canada's access to the United States market for energy goods. The two countries have recognized that they have a common interest in ensuring access to each other's market and enhancing their mutual security of supply. They have, therefore, built on their existing GATT rights and obligations and agreed that, as each other's best customers, they should get fair treatment should there be any controls on energy commodities. Both remain free to determine whether and when to allow exports and may continue to monitor and license exports.

Article 902 affirms Canadian and U.S. rights and obligations under the GATT on trade restrictions in energy products. This includes a prohibition on minimum export or import price commitments. More particularly, the United States has agreed to eliminate all U.S. restrictions on the enrichment of Canadian uranium and Canada will eliminate the requirement for uranium to be processed before it is exported to the U.S. The United States has also agreed to end its total embargo on exports of Alaskan crude oil and allow Canadians to import up to 50,000 barrels a day. These commitments are described in Annex 902.5.

Where either Canada or the U.S. applies import or export restrictions to energy trade with other countries, it may limit or prohibit the pass-through of imports from those other countries into its own territory. It may also require, in such instances, that its exports to the other be consumed within the other's territory.

Article 903 on export taxes restates the obligation of Chapter Four not to impose taxes or charges on exports unless the same tax is applied to energy consumed domestically. Article 904 on other export measures restates the obligations of Chapter Four that export restrictions may not reduce the proportion of the good exported to the other party relative to the total supply of the good compared to the proportion exported prior to the imposition of the restriction. It also prevents the use of licenses, fees or other measures to charge higher prices for exports when such restrictions are used for short supply, conservation or domestic price stabilization reasons.

This article also provides that export restrictions not be designed to disrupt normal channels of supply or alter the product mix as between various types of specific energy goods exported to the other country. For example, if Canada in future decides to implement measures to limit the consumption of oil, it can reduce exports to the United States proportional to the total supply of oil available in Canada. Any such restrictions must not be designed to disrupt normal trade patterns.

The two countries have also agreed to allow existing or future incentives for oil and gas exploration and development in order to maintain the reserve base for these energy resources.

The chapter recognizes the important role played by the National Energy Board in Canada and the Federal Energy Regulatory Commission and the Economic Regulatory Administration in the United States. If discrimination inconsistent with this agreement results from a regulatory decision, direct consultations can be held with a view to ending any discriminatory action, such as the decisions earlier this year by the Federal Regulatory Commission prohibiting Canadian suppliers of natural gas from passing all their shipment costs on to their customers.

In Annex 905.2, Canada undertakes to eliminate one of three price tests which the National Energy Board (NEB) applies to exports. Through these tests, the NEB assesses whether all costs have been recovered, whether the offered price would not be less than the cost to Canadians for equivalent service, and whether the offered price would be materially less than the least cost alternative for the buying entity. It is this "least cost alternative test" only which is being eliminated.

The United States will require the Bonneville Power Administration to treat British Columbia Hydro no less favourably with respect to access to power transmission lines than utilities located outside the US Pacific Northwest. The two governments state their expectation that Bonneville Power and British Columbia Hydro will continue to negotiate mutually beneficial arrangements on the use of power transmission lines.

Article 907 provides a tighter national security exception than is contained in the GATT and for the agreement as a whole, while Article 908 indicates that the provisions of the Agreement on an International Energy Program, which governs trade in oil during tight supply conditions, take precedence over the provisions of this chapter.

Chapter Nine

Energy

Article 901: Scope

1. This Chapter applies to measures related to energy goods originating in the territory of either Party.

2. For purposes of this Chapter, energy goods refer to those goods classified in the Harmonized System under:

a) Chapter 27 (except headings 2707 and 2712);

b) subheading 2612.10;

c) subheadings 2844.10 through 2844.50 (only with respect to uranium compounds classified under those subheadings); and

d) subheading 2845.10.

Article 902: Import and Export Restrictions

1. Subject to the further rights and obligations of this Agreement, the Parties affirm their respective rights and obligations under the *General Agreement on Tariffs and Trade* (GATT) with respect to prohibitions or restrictions on bilateral trade in energy goods.

2. The Parties understand that the GATT rights and obligations affirmed in paragraph 1 prohibit, in any circumstances in which any other form of quantitative restriction is prohibited, minimum export-price requirements and, except as permitted in enforcement of countervailing and antidumping orders and undertakings, minimum import-price requirements.

3. In circumstances where a Party imposes a restriction on importation from or exportation to a third country of an energy good, nothing in this Agreement shall be construed to prevent the Party from:

a) limiting or prohibiting the importation from the territory of the other Party of such energy good of the third country; or

b) requiring as a condition of export of such energy good to the territory of the other Party, that the good be consumed within the territory of the other Party.

4. In the event that either Party imposes a restriction on imports of an energy good from third countries, the Parties, upon request of either Party, shall consult with a view to avoiding undue interference with or distortion of pricing, marketing and distribution arrangements in the other Party.

5. The Parties shall implement the provisions of Annex 902.5.

Article 903: Export Taxes

Neither Party shall maintain or introduce any tax, duty, or charge on the export of any energy good to the other Party, unless such tax, duty, or charge is also maintained or introduced on such energy good when destined for domestic consumption.

Article 904: Other Export Measures

Either Party may maintain or introduce a restriction otherwise justified under the provisions of Articles XI:2(a) and XX(g), (i) and (j) of the GATT with respect to the export of an energy good of the Party to the territory of the other Party, only if:

a) the restriction does not reduce the proportion of the total export shipments of a specific energy good made available to the other Party relative to the total supply of that good of the Party maintaining the restriction as compared to the proportion prevailing in the most recent 36-month period for which data are available prior to the imposition of the measure, or in such other representative period on which the Parties may agree;

b) the Party does not impose a higher price for exports of an energy good to the other Party than the price charged for such energy good when consumed domestically, by means of any measure such as licences, fees, taxation and minimum price requirements. The foregoing provision does not apply to a higher price which may result from a measure taken pursuant to subparagraph (a) that only restricts the volume of exports; and

c) the restriction does not require the disruption of normal channels of supply to the other Party or normal proportions among specific energy goods supplied to the other Party such as, for example, between crude oil and refined products and among different categories of crude oil and of refined products.

Article 905: Regulatory and Other Measures

1. If either Party considers that energy regulatory actions by the other Party would directly result in discrimination against its energy goods or its persons inconsistent with the principles of this Agreement, that Party may initiate direct consultations with the other Party. For purposes of this Article, an "energy regulatory action" shall include any action, in the case of Canada, by the National Energy Board, or its successor, and in the case of the United States of America, by either the Federal Energy Regulatory Commission or the Economic Regulatory Administration or their successors. Consultations with respect to the actions of these agencies shall include, in the case of Canada, the Department of Energy, Mines, and Resources and, in the case of the United States of America, the Department of Energy. With respect to a regulatory action of another agency, at any level of government, the Parties shall determine which agencies shall participate in the consultations.

2. In addition, the Parties shall implement the provisions of Annex 905.2.

Article 906: Government Incentives for Energy Resource Development

Both Parties have agreed to allow existing or future incentives for oil and gas exploration, development and related activities in order to maintain the reserve base for these energy resources.

Article 907: National Security Measures

Neither Party shall maintain or introduce a measure restricting imports of an energy good from, or exports of an energy good to, the other Party under Article XXI of the GATT or under Article 2003 (National Security) of this Agreement, except to the extent necessary to:

a) supply a military establishment of a Party or enable fulfillment of a critical defense contract of a Party;

b) respond to a situation of armed conflict involving the Party taking the measure;

c) implement national policies or international agreements relating to the non-proliferation of nuclear weapons or other nuclear explosive devices; or

d) respond to direct threats of disruption in the supply of nuclear materials for defense purposes.

Article 908: International Obligations

The Parties intend no inconsistency between the provisions of this Chapter and the *Agreement on an International Energy Program* (IEP). In the event of any unavoidable inconsistency between the IEP and this Chapter, the provisions of the IEP shall prevail to the extent of that inconsistency.

Article 909: Definitions

For purposes of this Chapter:

consumed means transformed so as to qualify under the rules of origin set out in Chapter Three, or actually consumed;

restriction means any limitation, whether made effective through quotas, licenses, permits, minimum price requirements or any other means;

total export shipments means the total shipments from total supply to users located in the territory of the other Party; and

total supply means shipments to domestic users and foreign users from

a) domestic production,
b) domestic inventory, and
c) other imports, as appropriate.

Annex 902.5

Import Measures

1. The United States of America shall exempt Canada from any restriction on the enrichment of foreign uranium under section 161v of the *Atomic Energy Act*.

Export Measures

2. Canada shall exempt the United States of America from the Canadian Uranium Upgrading Policy as announced by the Minister of State for Mines on October 18, 1985.

3. The United States of America shall exempt Canada from the prohibition on the exportation of Alaskan oil under section 7(d) of the *Export Administration Act of 1979*, as amended, up to a maximum volume of 50 thousand barrels per day on an annual average basis, subject to the condition that such oil be transported to Canada from a suitable location within the lower 48 states.

Annex 905.2

Regulatory and Other Measures

Canada

1. Of the tests set out under subparagraph 6(2)(z) of the *National Energy Board Part VI Regulations* on the export of energy goods to the United States of America, Canada shall eliminate the "least cost alternative test", described in subparagraph 6(2)(z)(iii).

United States of America

2. The United States of America shall cause the Bonneville Power Administration to modify its Intertie Access Policy so as to afford British Columbia Hydro treatment no less favourable than the most favourable treatment afforded to utilities located outside the Pacific Northwest.

3. No other policy of the Bonneville Power Administration or law authorizing such policy need be changed insofar as such law or policy concerns energy sales, transmission of energy and related business arrangements between the Bonneville Power Administration and British Columbia Hydro.

General

4. It is understood that the implementation of this Chapter includes the administration of any "surplus tests" on the export of any energy good to the other Party in a manner consistent with the provisions of Articles 902, 903 and 904.

5. The Parties fully expect that the Bonneville Power Administration and British Columbia Hydro will continue to negotiate mutually beneficial arrangements consistent with the objectives of this Agreement and separately to seek any additional authorities that may be needed.

CHAPTER 8

INTERNATIONAL DIMENSIONS

8.1

THE NORWEGIAN OFFSHORE R & D STRATEGY: PAST EXPERIENCE AND FUTURE CHALLENGES

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Norway shares with Canada some of the challenges relating to petroleum activity in cold and harsh climates. It is therefore, my belief that we may learn from each other, both from a political and technological point of view. My main focus will be to present the Norwegian offshore R & D strategy, its political background and some of the challenges facing us now. For those who do not know too much about the Norwegian situation some general information might be useful.

In recent years the expression "energy country" has been used to characterize Norway. I think this fits very well. For almost a century abundant supplies of electricity based on hydro-electric power have been the driving force behind our industrialization. International dimensions became increasingly important with the discoveries of petroleum on our continental shelf. Our traditionally open economy provided a good basis for dealing with the new challenges and opportunities. Close to 50% of our earnings already originated from exports when we started to develop the hydrocarbon resources from the North Sea.

In 1986 the combined production of energy reached 1.5 million barrels of oil equivalents a day, which is more than four times the total Norwegian energy consumption. Production of crude oil accounted for about 56% of total energy production. Natural gas comprised about 31%, while production of electricity, previously our most important energy source, now makes up about 11% of the total production in the energy balance. Due to our rich endowment of hydropower resources, our energy consumption pattern is rather non-typical. The hydropower share covers 99% of our total electricity consumption, providing the basis for our vital energy intensive industrial sector. Around 90% of our petroleum production is exported. Norway's oil production at today's level could last for about 30 years based on proven reserves, while proven gas reserves could last for about 100 years.

Since the Ekofisk field came on stream in 1971, as the first major development project, the Norwegian economy has gradually adapted to a steadily increasing petroleum sector. The impact on the Norwegian economy is significant. In 1987 the petroleum activity accounted for:

- 10% of the gross national product (GNP)
- 28% of total exports
- 19% of gross investments

The dramatic fall in crude oil prices had a major impact on the Norwegian economy. From 1985 to 1987 the petroleum sector's share of the gross national product fell from close to 20% to 11%. The export value of oil and gas as a percentage of total Norwegian exports fell from

almost 38% to 28%. But the most substantial decrease was the fall in payable taxes and royalties from about 47 billion NOKs in 1985 to 18 billion NOKs in 1987. These figures illustrate both the importance of the petroleum activity in the Norwegian economy and some of the dramatic consequences of falls in the oil price.

From this brief general overview I will turn to the Norwegian offshore R & D strategy, its origin and the experience with the different policy instruments which have been applied to promote offshore R & D in Norway.

The Norwegian offshore R & D strategy is an integrated part of our general R & D policy and an instrument in our petroleum policy. Offshore R & D has naturally been targeted as one of several growth areas for R & D in Norway and the development of new technologies is seen as vital for future activities in a high cost environment. The Norwegian government has tried to influence these developments both through indirect and direct policy instruments. We have, during the last decade, experienced a dramatic growth in R & D related to offshore technology. The economic volume today amounts to almost 2 billion NOKs or 17%-18% of total R & D in Norway.

The main objectives of the national offshore R & D strategy have been:

- to develop national competence to ensure economically sound exploitation of our petroleum resources,
- to enable the petroleum industry to function with the least detrimental effect on the environment, and under safe conditions, and
- to improve the competitiveness and growth potential of Norwegian industry and other business activities related to the petroleum sector.

What was the situation in the late 1970s when the oil activity in Norway still was in the initial stage? The technological competence was considered to be insufficient to meet the future challenges on the Norwegian continental shelf. There was a lack of R & D infrastructure and personnel to support the oil industry. The situation which the policy-makers at that time saw was that the petroleum production could mean large scale import of necessary technology. This prospect was of course frightening from a political point of view. In the late 1970s an increasing number of international oil companies wanted to take part in the offshore activity on our shelf. The North Sea was, from the companies' point of view, an area with a promising geological and economical potential and low political risk. The latter should not be underestimated in the aftermath of the oil-crisis of 1973. Offshore activity in the North Sea was also of interest to the companies from a technological point of view. The North Sea represented a frontier area in technological terms, a kind of laboratory for the international companies. For the companies, the North Sea represented a possibility to improve their competence in undertaking projects offshore in a more unfriendly environment.

There was, in the late 70s, a kind of convergence of interests between the Norwegian state and international business. The foreign oil companies represented a resource and know-how base which was of great interest to the Norwegian society. The Norwegian state on the other hand possessed oil in the ground which was of interest to the companies.

What became the policy response in a situation with an apparent need for a large scale technology transfer from the foreign oil companies to Norwegian society?

Certain institutional arrangements were established to stimulate this technology transfer in the petroleum sector. This policy framework is, in Norway, referred to as the "Technology Agreements" between the oil companies and the Norwegian government. The major objective behind these agreements was to generate a rise in the level of Norwegian competence in the offshore sector and to develop an independent national technological environment. The case of the Technology Agreements has illustrated that it is possible for an active government to organize the scope and quality of technological developments in close cooperation with the oil industry.

One basic belief behind these agreements was that society as a whole, through appropriate means, must be able to exert basic control over petroleum activities. This follows from the fact that petroleum on the Norwegian continental shelf is a resource which is the property of Norwegian society. The government stated 15 years ago that the oil activities should benefit society as a whole. This is still a main political guideline. When the Technology Agreements were introduced in 1979, they reflected clearly this political guideline.

The two types of agreements which are still in operation today are the so-called 50 percent agreements and the goodwill agreements. These agreements were intended to include R & D projects related to the Norwegian continental shelf. The 50 percent agreements are frame agreements concluded with all operators from the 4th round of concessions in 1979. These agreements require the operator on behalf of the joint venture on the licence, to carry out at least 50% of the R & D necessary to develop the individual block. The goodwill agreements are also frame agreements which contain a declaration by the international oil company to carry out as much petroleum-related R & D in Norway as possible, without this entailing any real obligation as regards financial sum or input. The purpose of the goodwill agreements is to stimulate those parts of the companies' R & D activity which are of general relevance for the petroleum activity and not covered by the 50 percent agreements. The effort of the individual oil company under the goodwill agreement has been one out of several criteria employed by the government when concessions are allocated. This linkage to the allocation of concessions made the goodwill agreements a powerful instrument in the overall Norwegian offshore R & D strategy.

When the Technology Agreements were instituted in the late 70s the objectives were:

- to get the oil companies to carry out more of their R & D in Norway,
- to build up R & D competence in the Norwegian industry and research institutes,
- to improve the basis for Norwegian decision-making at all levels of petroleum activity,
- to improve the actual resource utilization.

After the first phase of competence build-up this list of goals was extended. The government expressed in 1984 that increased weight will be put on projects which subsequently lead to the deliveries of goods and services to offshore activity. This reflected a more conscious concern for the practical results under the agreements and the industrialization of R & D results. This policy shift meant that involvement of industry in projects managed by R & D institutes was requested. Triangle projects between oil companies, R & D institutes and the industry have been perceived as the ideal adjustment to this change of policy.

The Ministry of Petroleum and Energy has the overall responsibility on governmental level for the general political framework of the Technology Agreements. The Norwegian Council for Scientific and Industrial Research (NTNF) is given the main responsibility for the coordination and evaluation of individual projects. We believe that this division of labour provides a framework on governmental level where both political and technical issues can be dealt with.

What has been the experience so far with the Technology Agreements?

The activity level of projects under the Technology Agreements has, in recent years, been around 500-600 million NOKs which is around 25% of total petroleum-related R & D in Norway. Projects for around 400 million NOKs are reported annually under the goodwill agreements.

It is our impression so far that the activity under the Technology Agreements with the oil companies has been positive for technological development in the petroleum sector. We have seen a faster development of technological competence than would have been the case without these arrangements. We have seen a diversified project portfolio, which has been necessary to solve the variety of problems related to offshore activity. The projects have ranged from the geosciences to drilling and subsea technology. The Technology Agreements have contributed to a build-up of infrastructure. Central R & D institutes have been established through these agreements. The Technology Agreements have further made the R & D environment less dependent upon international expertise. We have during the last 10-15 years witnessed a "norwegianization" of the technological development in the petroleum sector. The Norwegian oil industry and R & D institutes have been strengthened through cooperation with the oil companies. Valuable international experience has been acquired. We also expect that the activities under these arrangements will be beneficial in the longer run due to the international market contacts on the Norwegian continental shelf and the references achieved after testing of prototypes and demonstration of the final product. The projects under the Technology Agreements have also created a basis for an improvement in the competitiveness of the Norwegian oil industry and internationalization.

The Technology Agreements have illustrated that it is possible for a government to organize a general policy framework within which the market can operate. However, the state is only indirectly active, which means that the decisions concerning the individual projects are taken in the marketplace between the oil companies and the contractors. It will be important to maintain this market-oriented approach in the future. We believe that the Norwegian government in this field most effectively can attain its goals through the market rather than by detailed regulation.

Some criticism has been raised against these agreements at home. The major criticism has been that the critical transfer of technology from the development phase to the commercialization and applications on the shelf is ineffective. This argument says that there has been too little industrialization and too much competence build-up. Another critical argument has been that the petroleum sector is occupying too much of our R & D capacity and pushing the prices up for R & D services in general. There are some fears that we are laying too many eggs in the same basket. The government is continuously reviewing such criticism. We have to be able to cope with institutional change where it seems appropriate and necessary.

The Technology Agreements have been a Norwegian peculiarity in an international perspective. The other North Sea states such as the U.K. and Holland have not formalized the R & D cooperation with the companies to the same extent as Norway. Norway did not have the same experience with multinational oil companies within a national context as did Holland and the U.K. We therefore believe that our policy has in fact strengthened the competitive edge of our R & D environment.

Some more direct policy instruments are also important in the Norwegian petroleum R & D strategy. The Norwegian government has, despite the large private sector, expressed the view that the state has a certain direct responsibility for offshore-related R & D. We have seen that gaps between private efforts and national objectives can develop.

Our experience has been that public R & D programs which are strictly managed by goals and limited in time are more efficient. Concentration of scarce public funds is thought to give a better management and more effective use of technical and economic resources. The public money should basically go to more basic R & D where the incentives in the private sector are weaker.

Due to the technological challenges we are faced with, we should focus on R & D activities in certain defined areas. The Norwegian government has given priority to the following areas:

- Improved oil recovery, which has already been organized in a State Program for Improved Oil Recovery (SPOR)

- Utilization of natural gas, which has been organized in a State Program for Utilization of Natural Gas (SPUNG)

- Basin Modelling, which is in a starting phase

- Development Technology, which is expected to start in 1989 with sub-programs under the headings:

    - Floating Production Systems
    - Multiphase Flow
    - Drilling Technology

- Industrialization of R & D results, which has been considered a "bottleneck". Several good concepts are not exploited industrially. One reason for this has been the lack of capital to projects with a high technological content and high risk. The Government has provided some capital to these types of projects.

We have to adjust the offshore R & D strategy to the future challenges on the Norwegian continental shelf. I will point out some of these challenges, and their relevance for R & D activities.

The first and most important challenge is to adapt to the increased volatility on the market side. Two years ago we had one of the most dramatic price decreases in the history of the petroleum industry. It has been a tremendous technological challenge for the oil industry in Norway to adapt to the new world of lower oil prices. Norway is a high-cost production area

and it has become extremely important that the Norwegian R & D environment can contribute to the development of new or simplified cost-effective solutions. History has shown that situations of crisis may release innovations and new ideas. We hope that this will be the case on the Norwegian continental shelf.

A second challenge for the Norwegian R & D environment is the fact that the exploration activity is moving towards northern areas with a colder climate, deeper water and a rougher environment. Key blocks in the Barents Sea have now been awarded. It is a consensus between the government and the oil industry that the major goal in the northern areas is to find more oil. This is important to achieve the necessary regional industrial spin-offs in northern Norway. The Barents Sea is our most important new exploration area. However, we are in the first phase of exploring these huge areas. So far it has been drilled on large structures in different geological areas. The results have been encouraging for further exploration despite the fact that only gas has been found in significant quantities. Future field development in the Barents Sea will confront us with many technological challenges. Colder climate, dark winters and a vulnerable biological environment are all factors which must be considered in the R & D priorities ahead of us. Arctic and polar technologies are not yet on the list of high priority R & D fields but will certainly be of interest in the near future.

A third challenge which has to be coped with, also from the R & D point of view, is to find new markets and ways of utilizing the gas reserves. In the past, Norway has been described as an oil nation. However, Norway has, for more than ten years, been exporting gas to the U.K. and the Continent. In the long run it will be natural to regard Norway primarily as a gas producer. We know that our gas reserves are as large as the reserves of all other European countries. After year 2000 Norway is anticipated to be the only major resource base in western Europe. Historically, Norway's attention has centred around the European gas market. Now a new challenge lies ahead. How do we integrate the gas industry within a national framework? We now have the possibility of building an internal market for natural gas. In future energy planning it could be more economical to generate electricity from gas than from hydropower.

The development of a Norwegian gas market must also be viewed in a Scandinavian context. It is an exciting perspective that all of Scandinavia may, one day, constitute one integrated gas market. In a longer perspective the United States might be an interesting market for Norwegian gas by the end of the century or later. The development of the gas prices in the U.S. and the costs associated with processing natural gas and transporting Liquified Natural Gas (LNG), will determine the outcome of this prospect. The gas resource base and the market outlooks for natural gas are major challenges in the Norwegian offshore R & D strategy. A state program on the utilization of natural gas has already been launched. The gas-nation, Norway, has to improve the different technologies linked to utilization of natural gas. The efforts will, in the first phase, concentrate on chemical conversion, production of electricity from gas and liquified natural gas. Gas research will certainly be a cornerstone in the future offshore R & D strategy.

A fourth set of challenges will be to integrate the concern for safety and environment in our R & D priorities. The tragic accident that took place at the Piper Alpha platform in July 1988 was a reminder of how fragile our technological solutions can be. No efforts should be spared in trying to make the offshore activities as safe as possible.

Our present Prime Minister, Mrs. Brundtland has been heavily involved in global environmental issues through the report from the World Commission on Environment and Development, Our Common Future. This report, which also has been supported strongly by the Canadian political authorities, defines the overriding political concept of sustainable development as a common framework for a better future. Although the report primarily addresses global problems, it has an impact on our national priorities in the petroleum sector. The hydrocarbon resources are non-renewable. This fact makes it vital to put emphasis on effective resource utilization. We cannot afford to waste hydrocarbon resources by leaving large amounts of these resources in the ground of the different fields. These resource considerations will be a strong argument to continue R & D activities which have the potential to improve the recovery of petroleum. The existing public program on improved oil recovery will therefore probably be another cornerstone in our future offshore R & D strategy.

Let me finally comment on the challenge and potential of international cooperation in this field. Technological cooperation across the borders of nation-states will always be an interesting option for the R & D environment in Norway. We are a small community and it is our experience that benefits follow from cooperation where complementary assets can be identified. After what I have seen here in Canada so far, it is my impression that Norway is sharing with Canada some of the experiences and challenges related to hydrocarbon development in northern areas. It must be the challenge of the R & D communities, on both sides, to see these possibilities and take the necessary initiatives.

8.2

CIRCUMPOLAR RELATIONS AND NORTHERN HYDROCARBON DEVELOPMENT

Report of Working Group
chaired by

Brigadier-General Clayton E. Beattie
President
Stratman Consulting Inc.

(Extracted and edited from transcript)

Introduction by Clayton Beattie

GENERAL

Having frequently observed that national leaders often plan their future security on the outdated military and political or economic concepts of the past, selected groups have come together from time to time in recent years either taking individual initiatives or forming think tanks and task forces to examine and test the lessons of the past against the realities of the present and the probabilities of the future. In ensuring that we don't become the victims of faulty strategic perceptions and plans, one of the regions recently identified as a new frontier in the realm of strategic, economic and military thinking is the Arctic.

Along with the introduction of supersonic bombers, submarine launched cruise missiles and intercontinental ballistic missiles, there has been introduced the need to modernize our strategic thinking. Adding innovative approaches and considering, in addition to traditional East-West perspectives, the global, and principally circumpolar concepts in assuring peace and security in the 1990s is the sort of scope that we're tackling in this discussion. One such study I conducted on behalf of Inuvik, specifically, and the Beaufort Sea region in general. I would like to take you back to that study, then forward to the future, looking to see and evaluate the progressive projects that will come onstream. And, in investigating the possibility of a zone of peace as General Secretary Gorbachev put it, in the circumpolar Arctic. I think you will agree with me that over the last few days we have been really homing in on the next area to see the action and that is the Beaufort and the pipeline from the Beaufort. But, I will speak of other parts of the Arctic as well.

Let me start with the strategic importance of Inuvik and the Beaufort as the lead into this question of circumpolar relations.

THE STRATEGIC IMPORTANCE OF INUVIK

Today, Inuvik remains as the main regional governmental centre for the northern Arctic, serving 12 communities with a total population of 8,500. It also serves as the major centre supporting the oil and gas industries in the Beaufort/Mackenzie Gulf area. It is also the transportation hub of the western Arctic. It is the main terminal for barge traffic on the Mackenzie River and since

1979 it has been linked to the cities of the South by the Dempster Highway providing the most cost-effective year round transportation and logistic support system for the western Arctic. The airport, whose initial criteria were directed to support development of the western Arctic, has a paved 6,000 foot runway and is capable of handling sophisticated jet aircraft. Canadian Airlines operates a twice-daily jet service between Inuvik and Edmonton and Northwest Territorial Airways recently extended its service to Inuvik. The airport could therefore serve as a forward airfield in the air defence of North America, providing priority defence against the cruise missiles threat to nuclear deterrent forces in the South as well as active defence and sovereignty operations over the Beaufort Sea, the Northwest Passage and the Sverdrup Basin. It might also serve as a station base for other military operations in the western high Arctic.

Inuvik's greatest potential for future growth and increasing strategic importance also follows from the rich natural resource reserves of hydrocarbons which lie beneath the seabed of the Beaufort Sea, which is in turn, strategically located on the western approaches in the Northwest Passage. The record of successful resource exploration in the Beaufort has been heralded by oil discovery such as Amauligak, J-44, Nipterk, Tuk J-29, Kopanoar, Issungnak, Tarsiut and Koakoak which will soon warrant the construction of an oil pipeline from the Beaufort via Inuvik to the South along the Mackenzie River Valley. Polar gas also anticipates construction of a pipeline which will transport natural gas commencing at the Taglu field. I think we've heard it referred to as a spur across to join the main line. The estimated cost of construction of a pipeline and related facilities, in the past year, was estimated at 3.3 billion dollars in 1984 dollars. But over the past 2 decades the pace of development has fluctuated under influences such as the Berger report and the alleged energy crisis. In spite of all negative effects, progressive activity in the fields of scientific research, exploration and development, has continued and resulted in a total investment of many billions of dollars.

The foregoing development of vital reserves of natural resources in the Inuvik and Beaufort region, serves to identify this region as one of most strategic importance. Why, then, has it been so difficult at times to gain acceptance of this reality and to have it reflected in regional deployment of military forces in defence of Canada and North America in the North. And when one says defence of Canada and the North, we're talking about this vast store of riches in the Beaufort region and in the Arctic Islands. Some of this lack of attention follows from faulty perceptions and I would like to look into that now.

TRADITIONAL PERCEPTIONS IN DEFENCE OF CANADA

Two of Canada's major defence commitments involve it as a member of NATO at home and abroad. Within North America it is involved with the United States through the North American Aerospace Defence Agreement.

The traditional perception has been that of an East-West threat to NATO with lines of commitment, deployment, reinforcement running from North America across to Europe. A perception that Norway is the NATO northern flank and Turkey is the southern flank. This perception fails to appreciate the global, and particularly, the polar perspective which reveals that the northern Rim is part of the NATO area of responsibility and influence and that northern Canada and the NORAD front are, in fact, part of the NATO northern flank. Faulty perception sees southern Canada and the United States as the backup to forces in Central Europe and what it neglects to appreciate is that all this part of the Rim from Norway across the North

Atlantic including Greenland and Canada and the U.S.A. are all part of forces deployment and that, in addition to being a sort of front line in the North, it's also a significant and strategically important part of the NATO northern flank. Failure to properly appreciate this fact presents the danger of coming to the same grief as did the Maginot line. In other words, the NATO front in Europe could be outflanked by attack against North America through the North.

It isn't difficult to develop possible scenarios which might range from covert operations by terrorist groups to more formidable military forces tasked to conduct secondary but complimentary operations or to hold hostage communities from which other enemy nuclear delivery systems might be positioned to attack selected targets in the South. Such suggestions are not presented to argue a case that would weaken our resolve to fulfill commitments in Europe, but rather to underline the importance of maintaining forces in being, which are fully trained to fly up to our North as well as to fly over to Europe in time of increased tension or difficulty. Now, I appreciate that with the spirit of Glasnost and Perestroika these considerations are perhaps out to the flanks. But, as you will see as I go through the paper and discuss subsequent information that these have been continuing concerns for Canada if we're expecting to protect a) our sovereignty, b) our very valuable resources.

Traditionally, the Canadian Arctic has been viewed as a wasteland; a frozen North, a buffer zone, or a cordon sanitaire. With the exception of installing the Distant Early Warning Line and establishing a small headquarters in Yellowknife, plus a few other installations, or conducting periodic exercises, the North, until recently was virtually neglected. But, developments such as have been described in the Inuvik/Beaufort Sea region are expanding across the North and they deserve serious consideration.

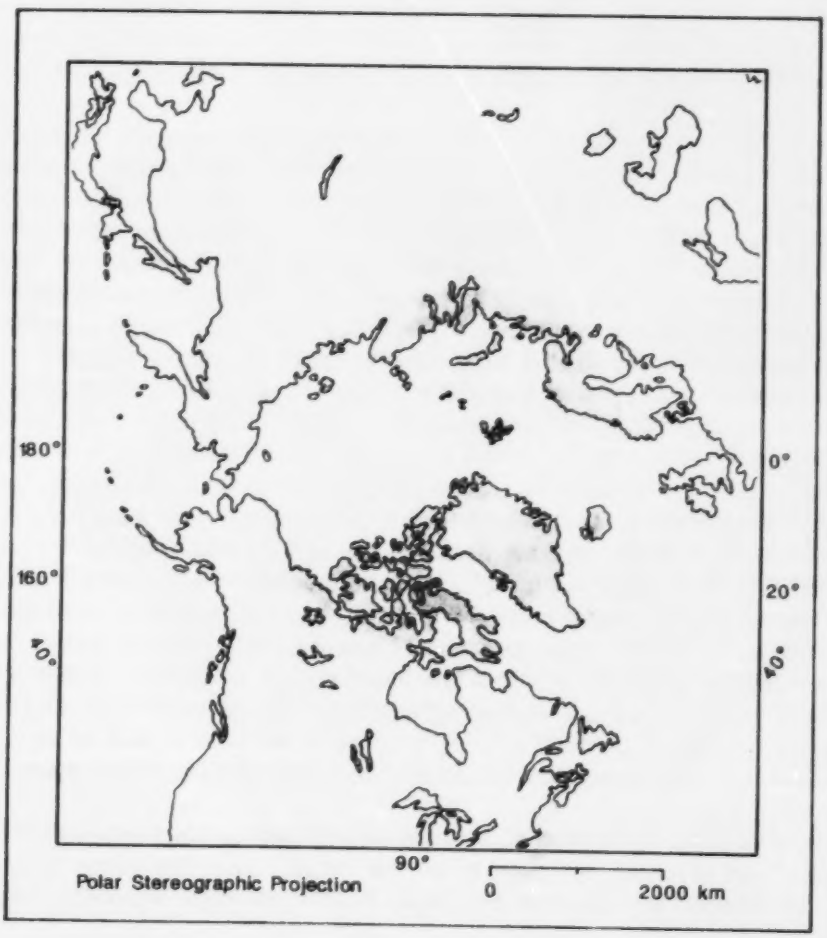
First, there's the discovery of the important strategic resources in the Canadian North. In some instances, these resources are located hundreds of miles beyond what used to be called the front line of defence, the DEW line, which ran along the 70th parallel of north latitude from Cape Parry in the West across to Cape Dyer in the East. We have the Beaufort Sea, the Northwest Passage and the Arctic Archipelago. Some leaders in the natural resource industry have estimated northern reserves of hydrocarbons that will eventually total about 620 trillion cubic feet of natural gas and 335 billion barrels of oil. Strategically important minerals such as uranium, gold, tungsten, lead and copper have also been discovered and their extraction makes an important contribution to the national development. The Geological Survey of Canada in its 1983 report gave an expectation of 1.3 billion cubic metres of recoverable oil and 1.86 trillion cubic metres of natural gas in the Beaufort Sea. But, these figures did not include the major finds of 1984/85 and which, I believe, have since been expanded.

The Northwest Passage is emerging as an important source of hydrocarbons and applications have been made for exploration drilling in the passage. It is pretty ironic when you look at the situation that early explorers viewed the Northwest Passage as a route to the riches of the Far East and now the fact is that it's going to be the route to the riches of the Northwest Passage, the Sverdrup Basin and the Beaufort Sea.

There is a pressing need to alter traditional perceptions and to develop improved military capabilities and the economic and political activity which will all be important to the development of the region. Now, much of the region is covered by ice almost all of the year and it's known that nuclear powered submarines capable of launching cruise missiles have passed through the Arctic under the ice and that aircraft can operate over much of the North,

indeed over most of the Archipelago and the Northwest Passage without detection by the radars as currently deployed. When one views the region from a polar perspective, it's apparent that CFB Alert, which is the northern-most base on Canadian soil, is approximately 150 km closer to Moscow than to Ottawa. And, that Resolute Bay, another nodal point in the communications network in the North, is a comparable distance from Winnipeg and possible northern Soviet staging airfields. Yet, moving west along the Arctic Rim, Inuvik and the Beaufort Sea region, the coast of the Yukon, are closer to possible staging bases in eastern Siberia. To some extent, this flank benefits from the security which U.S. forces in Alaska might provide. However, that doesn't absolve Canada from the responsibility for protecting these vital strategic resources and to the greatest extent possible, through surveillance and control, enhancing Canadian sovereignty throughout this strategically important region.

When one studies the polar projection of the high Arctic and examines the Arctic Rim it's clear that the north Yukon, the Mackenzie/Beaufort Region and the islands of the Archipelago are on the Rim and thus in the front line. Let me underline this important fact here. A conical projection is not as blatant as a polar projection but, you'll see that our Arctic comes to a point just under the pole and that's the way we saw it when we were going to public school and high school -- flat-out wall maps are very misleading and this is why we should always study transpolar problems, or circumpolar problems, using a polar projection.



You can make some very serious mistakes, some of which have already been made, in thinking that you're going along a valid defence line. For instance in the 1950s, we had various defence lines going up toward northern Canada, the last one was the DEW line. And, of course, when it came time to sign the most recent agreement in NORAD, the planners simply went with the updating of the technology along the 70th parallel of north latitude which is roughly the line of the Arctic mainland. Now, I'll explain what happened here.

In January of 1985, a special committee of the Senate on National Defence published the results of an enquiry into Canada's territorial air defence which focussed on one specific question. What policy should Canada pursue toward current proposals to modernize the North American Air Defence System? That most valuable report, presented in open literature, lists many of the considerations which must be addressed if the NORAD and NATO northern flank are to be secure against surprise attack by a growing Soviet bomber and nuclear powered submarine threat, capable of delivering cruise missiles against U.S. deterrent forces in North America. The report recognized that obsolescent ground based systems will have to be upgraded and that improved transitional ground based radar systems will have to be essentially for early warning of bomber initial attack until space based systems are deployed. The Senate report examined the options related to Canada's participation as well as the advisability of seeking a role at an early stage in the defensive space surveillance of the continent, either by developing a national military space surveillance programme within the framework of NORAD and associated with NORAD or by participating in the U.S. programmes.

THREATS TO SOVEREIGNTY AND CONTROL OF CANADA'S ARCTIC

In describing the transition components and other aerospace defence systems, the report notes that the north warning system might reach from Alaska to Southern Greenland along the coast of the Arctic Ocean. Conceivably, the present plans would be altered to reflect Canada's concern over the weakness of radar coverage in Labrador. And the interceptor aircraft in Canadian regions would be deployed to reflect NORAD's new peripheral thrust. They discussed it in terms that they were going to improve the technology but, in fact, missed the boat in not using that opportunity to relocate the line. Now, what about the circumpolar threat? When you go around the countries that front onto the Rim, you find that there are four who are already members of NATO, with Canada. Finland is not a member of NATO nor is Sweden.

In looking at the circumpolar threat and the considerations of the Soviet Arctic, I've come up with the following: the military threat posed by the U.S.S.R. in the Arctic is concentrated mainly in the Barents Sea and the region of the Kola Peninsula. You can see that they're adjacent. The Kola Peninsula acts as the base for 172 Soviet submarines, 39 of which are capable of firing ballistic missiles, and 41 major surface warships. In addition to extensive naval facilities in the Kola Peninsula, the Soviet Union also has 11 active military airfields and the Arctic basin and Soviet Arctic territories are integral to the maintenance of Soviet nuclear forces. The Barents and the Kola Seas are the operating areas for the northern fleet and the ballistic missile submarines, protected by the ice cover and the surface naval and air forces based in the Kola. So there is a tremendous concentration of military might in that region.

However, as we strive to meet such threats to the NATO alliance, as I mentioned before, four countries of whom we are one, are already on the Arctic Rim. The Arms Reduction Talks between President Reagan and General Secretary Gorbachev have seriously started to bear

fruit and the agreement to destroy intermediate range missiles, which indicates that the strategy of peace, through and with security, as has been pursued by the NATO alliance, seems to have been beneficial in these negotiations.

Speaking in Murmansk on the 1st of October 1987, Mr. Gorbachev articulated his Arctic Zone of Peace proposal which consisted of six points as follows:

1) a nuclear weapons free zone in northern Europe;
2) a restriction of naval activity in north European waters;
3) cooperation in the exploitation of resources in the Arctic;
4) an international programme for scientific study;
5) cooperation to ensure the environmental protection of the North; and finally,
6) joint development of a northern sea route from Europe to the Far East.

It seems strange that this old desire to get to the Far East is now being proposed by Mr. Gorbachev. He describes the threatening character of NATO militarization of the North. This, of course, is the Soviet view. He called on the West to seriously consider these proposals and to cooperate with him. Now, we have problems of our own on this Rim. Our circumpolar friends have even presented problems for us. We have one, i.e., the United States, who does not agree with our sovereign control of the Northwest Passage. We also have a dispute which remains to be settled on the extension of the boundary line between Yukon and Alaska. Of these two problems perhaps the second one can be sorted out to our mutual agreement. But, it would appear that the U.S. is going to hold firm on the fact that it will not recognize our sovereignty over the Northwest Passage and our claim that the Northwest Passage is internal waters.

The point that I want to make here, in concluding these remarks, is that we have been traditionally looking East-West or we have been solving the problems at the local level, and I'm not saying this doesn't have to be done. But, at the same time, I think we should bear in mind that we should be pursuing any cooperative efforts with members of the Arctic Rim who are colleagues and members of NATO. That we should be looking very carefully at the proposals of Mr. Gorbachev, because his strategy could well be to separate the NATO members who live on the Arctic Rim through bilateral agreements. And so, while they are good ideas, they should be tested carefully. I think we are already getting into cooperative pursuits with the Soviet Union in one trek to the Pole. We should continue to evaluate proposals for cooperation on their own merits. For background that you might wish to look at, this issue of Northern Perspectives, the Soviet North*, which brings out some of these points. In particular there's an article on joint ventures in Arctic Resource Development. Another one in which the essential arguments which I have been presenting were published is this edition (October 1986), in which General Greenaway and I had an article called 'Offering up Canada's North'. So, there are those two.

This terminates my presentation. I hope it's given us some food for discussion and I'd be glad to, just informally, kick the subject around at your pleasure.

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* Canadian Arctic Resources Committee: Northern Perspectives, Vol. 16, 4, 1988.

QUESTIONS/DISCUSSION

James Maxim: From a military point of view of development what is taking place with the update and with the strategic planning that the military has been doing in cooperation with the United States, with our NORAD allies and NATO allies? Has the issue of oil-gas hydrocarbon development, or the potential of that area, ever been raised in a sense of an assessment from a military point of view?

Clay Beattie: Not to my knowledge. In fact, I have been beating this drum since 1980 and when I left National Defence in 1982 I found it difficult to convince anybody who was within the policy group at that time, of any threat in the North. Now that has changed very significantly over the past 4 years, in particular.

James Maxim: But this change in the last 4 years, are they concerned with the oil and gas potential in view of a military threat or does one look at the updating at the same time in light of Glasnost and in light of Perestroika and in light of the agreements that the Department of Indian and Northern Affairs has with the Soviet Union in representing our government - there is closer cooperation, there are technical exchanges that are occurring, what's the next step in regard to the type of cooperation, or what we should be doing on our own to protect those resources?

Clay Beattie: I think what's happening is that our government appears to be cooperating. I think one has to examine why the Russians are interested in this? I guess it's because they want a peaceful condition in the Arctic. They want to sort out their economy. They want to get technology. They want, if at all possible, to get the high-tech capabilities of the West and, in particular, where high-tech affects the northern Rim, or the circumpolar North, they want to get as much information as possible.

James Maxim: What you are saying about strategic thinking is important in the area of petroleum development, and the opportunities that extend from that, but without downplaying the military-strategic points, I think Perestroika, and the influence of the rest of the world on economic and technology planning occurs in many more ways. I feel that Canada has not given this the same focus as in the traditional military area. To mention an example: a year ago 50% of the non-military submersibles used worldwide were Canadian developed, but the tremendous lead in opportunity that Canada had, I don't think it has kept. The offshore operators division of CPA or the Arctic group has a common interest with Canada and the government, that Canadian technology is developed to help Canadian industry and Canadian economic opportunities. Mr. Taschereau remarked this morning, that a major rationale for supporting Hibernia was the spin-off industrial benefits that occur in transferring technology worldwide from Canada. If we are going to see Beaufort development proceed, we ought to be looking at bringing about a spreading of Canadian technology and influence, and that comes back to a relationship with the Soviet Union and other polar countries. I think this workshop should recommend Canada giving more attention to the areas of Canadian technology leadership and economic opportunity, with more of a strategic lead being given by government and industry.

Shifting away from the military focus, if you want to exert sovereignty look at the Inuit people who call the Arctic Islands home. At Energy, Mines and Resources, scientists are said to be expressing Canadian sovereignty when they are doing their experiments in the North. They are not, in fact, living there their whole lives. Some of the points made in Yellowknife, come in here. People said "we're going to stay here, you can come and go, but we're going to stay here". I would like to pick up on that notion of sovereignty being something that is a living, breathing kind of notion rather than a cold military one.

Clay Beattie: I agree in general with the tenor of your observations. Certainly, there must be many ways by which we can strengthen our sovereignty in the Arctic. Cooperating in areas related to northern development, environmental protection and scientific investigation should all lead to the enhancement of our own cause. However, again I would remind you that we have NATO allies who are sensitive to the real thrust in the Arctic Rim. What I wish to underline here is that our cooperative efforts in northern development should, if at all possible, spring from an agreed approach in matters which will affect the balance of our security and cooperation on the Arctic Rim.

CHAPTER 9

THE CONFERENCE REVIEWED

9.1

CONCLUDING REMARKS

Michael Jarvis
President
Michael Jarvis Consultants Limited

My concluding remarks will attempt to sum up the impressions gained in the last few days from representatives of industry and the two levels of government attending the conference.

Before starting my summary, I would like to go over an outline that David Marshall gave me, of the conclusions of the Environmental Review Process working group meeting, with the request that they be given at this time. I agreed to do so because, for many of the delegates attending the conference, this process is of special interest. The working group on "An Integrated Environmental Review Process for Northern Hydrocarbon Development: Yes or No?" concluded after lengthy discussions that its members could not reach a decision on an integrated or coordinated environmental process. There was however, unanimous agreement that something had to be done with the system. There was certain flexibility in current processes and attitudes that should enable improvements to be made. Existing discussions of means to improve the situation should also be expedited. The recommendation of the working group is that there should be a workshop to be attended by representatives of all those interested of all review processes to see what could be done to avoid duplication and to develop an integrated hearing process for reviewing northern hydrocarbon development. Ron Livingston, of the Government of the Northwest Territories has agreed to host such a workshop in the spring of 1989 and I assume that you will be hearing from Ron or someone else about plans for the event as they develop.

My main comments, with which some of you are familiar, will attempt to reflect the views of the various major groups referred to earlier as to the issues this conference raises, particularly those that they consider should be looked at in the months to come; the purpose of doing this is to give each group some idea of the priorities, concerns and interests of the others.

I will start with the views of the federal side which provided strong federal support for the conference. Its purpose in doing so was to encourage discussion of the issues of principal relevance to development of the North's hydrocarbons. There was a clear desire on the part of the responsible officials to move matters ahead and it was hoped that this conference would help in that regard. They attached particular importance, and I'm sure that industry will agree, to regulatory processes that are certain, simple and consistent, the need for which has, in their view been underlined by this conference. To achieve this, industry does not have to set out detailed plans. However, officials have to have a clear idea, in general terms, of where industry feels government should fit in. The point was made in this connection that officials have a much better chance of influencing developments before they take place than after. In brief, better communication is essential to a better system.

Officials with the Northwest Territories and the Yukon governments said that there was a changing environment leaning to a greater territorial presence and involvement in oil and gas questions. They welcomed this because they have a broad interest in responsible development of these resources which are of very great importance to the peoples of the territories. They noted that implementation of the changes that will occur as a result of the Northern Accord will take many years, but that the territories should become immediately involved in the major issues before it comes into effect.

There are, in the view of these officials, challenges for the territories to deal with as part of the overall resolution of the development question. They include the challenge of responding to the aboriginal groups and their land claims and the challenge of meeting the needs of all Northerners. There is a further requirement that the territorial governments and others looking at the question of development, be sensitive to a rate of development that can be sustained by the environment.

I have left the comments of some of the industry representatives present at the conference, to the end, because they are longer, and ultimately it is industry that will have to bring about development.

There has been a delay of some years in moving ahead with development, particularly as a result of the Berger Commission. This delay is seen to have been very useful as it has enabled studies to be carried out and additional experience to be gained. As a result, all the parties are much better able to deal with the issues that will come with actual development. Valuable experience has been gained in a number of key areas - export, exploration, pipelines, technology and particularly in working both with the territorial governments, as they have become more involved, and with the native people.

A number of very important issues remain, beginning with working out a political regime and a Northern Accord. The Northern Accord is a good start, but has to be fleshed out. And, if it is going to achieve its objective of taking into account the interests of the various groups concerned with the North, it will have to be balanced. It cannot reflect one point of view.

Land claim settlements are a further important element of any northern agreement and will obviously have to reflect the wishes of the aboriginal groups. They also must be realistic if companies which must compete outside of the North are to continue to participate in its development. Realistic fiscal regimes are equally essential. They must be flexible. No one wants a repeat of the Petroleum Gas Revenue Tax (PGRT) where there was a fixed levy on income that ended up achieving exactly the opposite objective of the policy of which it was part. The fiscal regime should also take into account, and I guess this relates to any sort of levy in income, the possibility of prolonged continuation of low oil prices. Companies, especially the smaller and medium sized ones, which are largely owned by Canadians, spend more than they retain. A regulatory framework is also essential. It should be fair and straightforward. The importance of consistency in this regard was the most frequent comment of those I received.

There were strong concerns registered about environmental processes. The disadvantages of a number of mostly overlapping environmental processes are very much at the front of the thinking of many companies.

Bringing together a coordinated effective regime means that the various parties will have to work with one another. Cooperation must include native peoples' groups. There is not much point in having government agreement if other key elements covered do not go along with the outcome. Some of the talks given on Friday in Yellowknife were very relevant in this connection; I recommend when you get the Proceedings that you have a look at the statements by Roger Gruben and Bill Erasmus.

To sum up, industry recognizes the rights and aspirations of the people of the North and will do much to help them. It also requires a stable, predictable, regulatory regime and adequate financial return. A good start has been made in this regard but there is still a lot to do, which brings me to my final remark. The purpose of this conference was to define the issues raised by the development of Canada's northern hydrocarbon resources and to help bring the various groups together in a converging path that would lead to their positive and early resolution. The word global was added to the title to emphasize that there are important international dimensions, involving not only experience, but essential foreign contributions such as capital, technology and markets. It must also be remembered that for development to take place the conditions must be competitive with those available elsewhere to industry.

In closing I would like to remind you of Maurice Taschereau's comment this morning that there was a window of opportunity but it could well be fleeting and we should all be prepared to take advantage of it when it is there. With that, I would like to close the conference. Thank you for coming and may hydrocarbon development in the North move forward more effectively and faster for your all having been here.

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